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# PCWorld

FEBRUARY 2016

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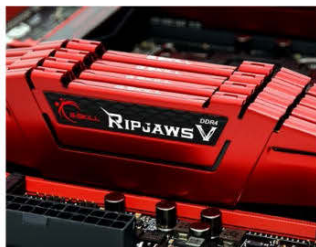


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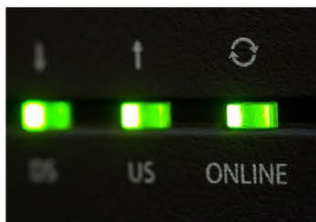
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# NEWS

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# The wild, weird, and powerful PC hardware of CES 2016

BY BRAD CHACOS

**PCWORLD EDITORS** have spent several long, exhausting days in Las Vegas, combing the frenzied floors of CES 2016 for a glimpse of the future of computing, and we didn't walk away disappointed. But don't take our word for it; check it out for yourself. Here, all in one place, we offer the wildest and most powerful PC gear from CES 2016.

## AMD Wraith cooler

Enthusiasts may sneer at stock coolers, but the vast majority of PC users don't overclock their processors. So it's nice to see AMD address the long-standing issue of noise in its stock cooling solution. The new Wraith cooler features a larger design with a bigger fan that runs constantly at lower speeds. That combination makes Wraith far quieter than its predecessor. Look for it to ship with undisclosed AMD chips later this year.







## **“Skull Canyon” NUC**

After months of rumors, it’s official: Intel’s creating a powerful, quad-core version of its tiny NUC PC, dubbed Skull Canyon. It’ll be a bit larger than the standard NUCs shown above on account of its more potent parts, and it’ll come equipped with Intel’s high-end Iris Pro integrated graphics.



## **Intel’s Core M Compute Stick**

Intel’s itty-bitty PC-on-a-stick has captured the attention of PC enthusiasts, but being limited to lesser-powered Atom chips has somewhat lessened its appeal. No more! Two new Compute Sticks—which plug into TVs or monitors—will be “in production” soon, with sixth-generation Core M3 and M5 processors more powerful than anything Atom can dish out.



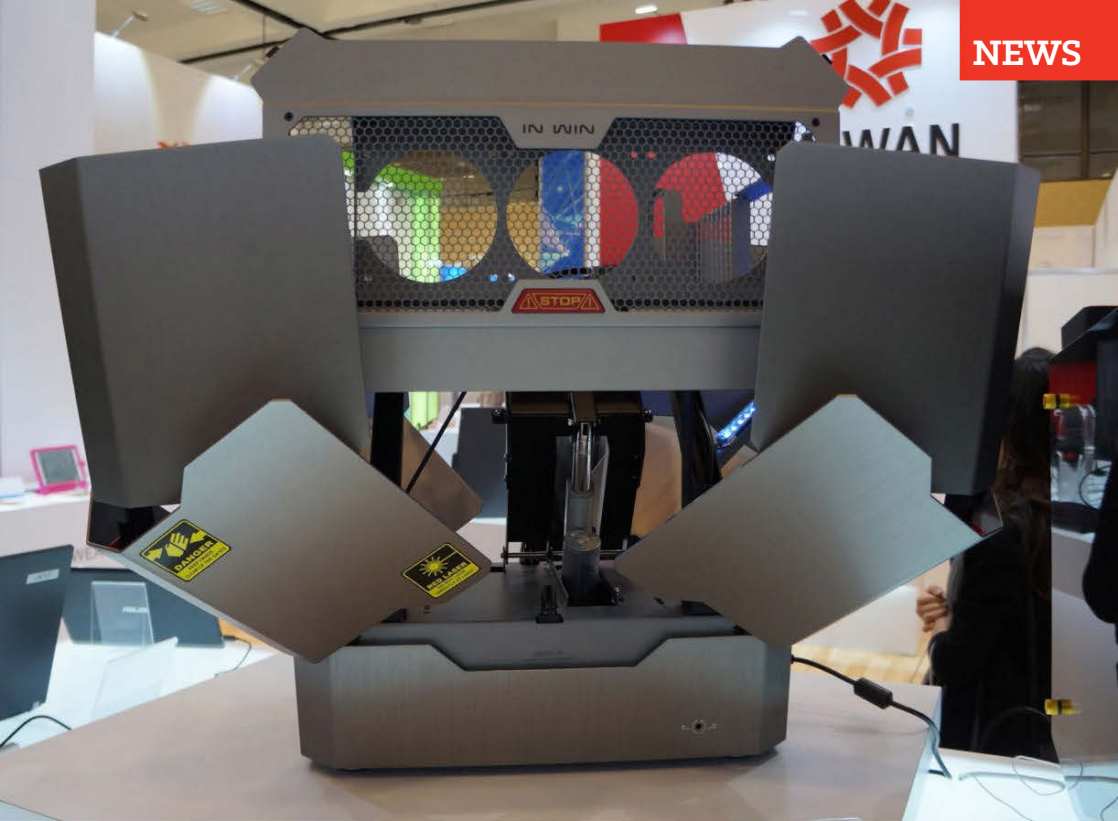
## Endless Mini PC

The \$79 Endless Mini PC costs even less than Intel's Compute Stick, but it pretty much has to, as it's designed for use in emerging markets that lack consistent Internet access. The humbly spec'd Endless Mini caches as much information from webpages as it can to its 24GB or 32GB of storage, with the aim of providing Internet content even if an Internet connection is unavailable. Nifty.

## Lian Li desks

Lian Li is famous for crafting wild PC cases, and that predilection was on display at CES 2016. The company showed off two unique chassis among their usual fare: The one below is crafted to look like a cruise ship, with enough room for a Mini-ITX build with a 300mm-long graphics card inside, while the DK-04 is a new PC desk model (as in, a desk you build your PC inside of) with adjustable height controls that let you use it as either a standing desk or a traditional desk.





## InWin cases

No, that's not a Decepticon—though it does transform. InWin had a slew of audacious PC cases on display at CES, including this shape-shifting bad boy. We've got a video of InWin's eye-catching highlights at [go.pcworld.com/InWinvideo](http://go.pcworld.com/InWinvideo).

## Oculus Rift preorders

One of the biggest trends of CES 2016 was the rise of virtual reality, and the gear that kicked off the craze finally opened to preorders and got slapped with a sticker price—while consumers got slapped with sticker shock. The Oculus Rift will cost a whopping \$600, and that's without the Oculus Touch controllers. Gulp.







## TP-Link's tri-band router

Networking's an important part of the PC ecosystem, and one router in particular caught our eye at CES: TP-Link's Talon AD7200, the first true tri-band router. It's been a long wait, but a hybrid 802.11ac/802.11ad router is finally headed our way sometime this spring, operating on the 2.5GHz, 5GHz, and 60GHz frequencies.

## IdeaCentre Y900 Razer Edition

Razer's always good for eye-opening CES announcements, and CES 2016 was no different. The company announced the IdeaCentre Y900 RE, a Razer-branded and peripheral-outfitted reskin of Lenovo's IdeaCentre Y900...





### **Razer Stargazer**

...and the Razer Stargazer, a webcam designed for pro streamers that's basically a fancied-up version of Intel's RealSense camera...



### **Razer Blade Stealth and Razer Core**

...and the Razer Blade Stealth, a slim non-gaming Ultrabook designed to be augmented for gaming with the new Razer Core external graphics dock via Thunderbolt 3. Groovy.

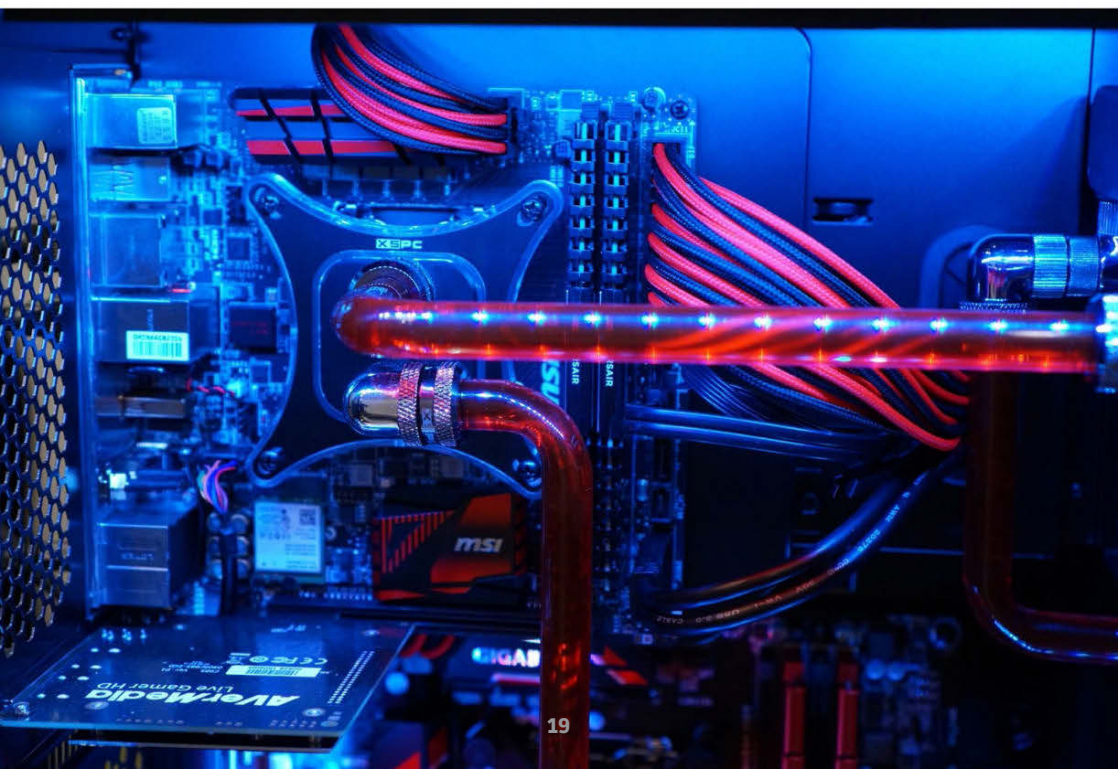


## **Asus ROG XG Station 2**

Razer wasn't the only PC maker with a new external graphics card dock. Meet the Asus ROG XG Station 2, which features more aggressive lighting and design aesthetics than the Razer Core, and on a more practical level, connects via a pair of USB-C/Thunderbolt ports so it can charge your laptop and let you get your game on simultaneously.

## CyberPower Pro Streamer PC series

Sure, anybody can stream their PC games fairly easily with ShadowPlay or OBS, but professional live streamers use two PCs to broadcast their adventures. That's because encoding and gaming are both CPU-intensive, so doing both tasks on the same machine can affect performance. Enter CyberPower's new Pro Streamer PCs, which are capable of housing two discrete PC builds inside of a single case. The two PCs (one Skylake desktop, another mITX build) share the same power supply, liquid-cooling, and case, but that's it.







## MSI's GeForce SLI bridges

SLI bridges are practical devices at their core, used simply to run multiple GeForce graphics cards in a single PC. Heck, most gaming motherboards toss one in for free. But MSI's new 3-way and 4-way SLI bridges bring the bling to multi-GPU systems with premium materials, a LED-lit MSI gaming logo, and—get this!—a silent Cooler Master fan attachment that connects to the bridge to increase airflow between your graphics cards.

It's ludicrous. It's over the top. I love it.

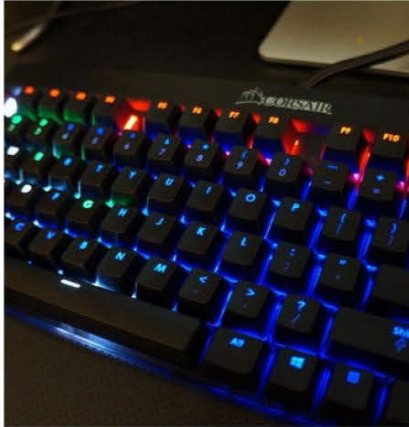


## MSI gaming laptops

MSI launched numerous gaming laptops at CES 2016. Perhaps the most interesting is the GT72 Dominator Pro Tobii, a variant of the GT72 notebook equipped with Tobii's gaze-tracking technology, allowing you to sign in to Windows, control PC games, and more using your peepers.

## Corsair RGB SDK

RGB backlighting on keyboards finally has a productive purpose. Corsair's RGB SDK allows game developers to map key lighting to in-game gameplay, so that, for example, your weapon keys are green until you run out of ammo, at which point they turn red. Another demo'd trick was mapping your health to the lighting on the Function keys, which slowly faded to black to match the dwindling health bar as enemies attacked.



## Corsair cases

Corsair also showed off a trio of new PC cases. The \$80 Spec-Alpha features an aggressive angular design, while the Carbide Quiet 400Q is padded with sound-dampening materials and the Carbide Clear 400C sports a swing-out glass window on the left side.



## Asus motherboards

Relatedly, Asus launched a trio of new ROG motherboards as well, all of which feature the company's new customizable Aura lighting effects.

But it's the little extras that are almost more interesting. Asus teamed with the liquid-cooling gurus at EK Waterblocks, designing the ROG Maximus VIII Formula (pictured), a Z170 ATX motherboard with a custom CrossChill waterblock to keep your VRMs nice and chilly.

The Asus 970 Pro Gaming/Aura, meanwhile, is the first-ever AMD 970 board officially certified by Nvidia for SLI GeForce setups.



## LaCie Chrome

This gleaming tower of chromed-out glory isn't just excessive on the outside. The aptly named LaCie Chrome portable drive is just as over-the-top on the inside, where you'll find two SSDs configured in RAID 0 to deliver face-meltingly fast 940MBps speeds. Whoa.

## Logitech G502 Proteus Spectrum

Logitech's G502 Proteus Core is *PCWorld's* favorite gaming mouse (and we've tried a ton of gaming mice). The G502 Proteus Spectrum is the Proteus Core, but equipped with customizable RGB lighting. 'Nuff said.







## WiTricity wireless laptop charging

Wireless phone charging sounds better in theory than practice, as it still requires placing your handset on a stationary charger. Wireless laptop charging, on the other hand, is a much more compelling proposition, as the primary use case of laptops involves plopping 'em on a desk anyway.

WiTricity's use of tightly coupled magnetic fields to transmit the power through stone, metal, or even your head—and with far higher output—makes it better suited for laptops, which draw far more power than smartphones. We saw a demo of WiTricity wireless charging in action and it worked exactly as promised. Even better, the company says it's partnered with top PC makers to ship the technology in actual laptops this year. 🔌

# Seagate reveals a gargantuan 8TB hard drive for NAS boxes and desktop PCs

BY MARK HACHMAN

**SEAGATE IS BOOSTING** the maximum size of its everyday hard drives with an 8TB HDD optimized for NAS boxes.

While larger consumer hard drives exist already, they tend to be for archival purposes only. Seagate's latest drive is designed to fit in a network-attached storage (NAS) bay. NAS boxes can be used by consumers to store large quantities of videos, photos, and music on a local network, and are also ideal for creative

professionals dealing with large media files. Desktop PCs could also make use of these drives in a RAID setup ([go.pcworld.com/raidsetup](http://go.pcworld.com/raidsetup)).


Seagate first announced its NAS-optimized HDD line in 2013 ([go.pcworld.com/NASOptimized](http://go.pcworld.com/NASOptimized)), promising to dampen vibration, consume less energy, and operate more quietly than conventional drives. However, the 8TB version demands nearly twice as much



power as Seagate's 4TB version, at 7.2W idle and 9W operating. On the bright side, the new drive supports a 216MBps max sustainable transfer rate and 256MB cache, both major improvements over Seagate's smaller drives.

Like other Seagate NAS drives, the 8TB HDD supports NAS boxes with up to eight drive bays, so users could have 64TB of storage available at home if they wanted. NASWorks error correction technology is also included, and the drive comes with a three-year warranty.

Seagate's 8TB HDD will have a \$385 suggested price tag according to Anandtech ([go.pcworld.com/anandtechprice](http://go.pcworld.com/anandtechprice)), and will ship later this quarter. The company already sells 6TB and 4TB versions for \$300 and \$230, respectively, though it's possible to find them on sale through retailers such as Amazon and Newegg.

**Why this matters:** The average user probably won't have much need for an 8TB NAS drive, especially when you can throw a pair of 4TB drives into separate bays for much cheaper. But as with any new storage milestone, this will likely bring down the price of NAS-optimized storage in general, making the prospect of setting up a local media and file server much more tempting. 

This new storage milestone will likely bring down the price of NAS-optimized storage in general, making the prospect of setting up a local media and file server much more tempting.



# Microsoft Patch Tuesday kills off Windows 8 and Internet Explorer 8, 9, and 10

BY IAN PAUL

**YOU'VE HEARD OF** Christmas in July. Well how about spring cleaning in January? Microsoft is kicking off 2016 with arguably its most significant Patch Tuesday in months. Microsoft has bid goodbye to all but one version of Internet Explorer ([go.pcworld.com/goodbyeIE8910](http://go.pcworld.com/goodbyeIE8910)) and a Windows release ([go.pcworld.com/cutoffwin8](http://go.pcworld.com/cutoffwin8)) it would rather forget.

The biggest item on the chopping block is Windows 8. Not Windows 8.1—that sweeping update is still supported—but the original, non-Start-button version of Windows 8. After the update, Microsoft ceased

support for the 3 year, 2 month, and 17-day-old operating system. That means Windows 8 is going the way of Windows XP; no more security updates, no bug fixes, nothing.

Users still on Windows 8 will have to upgrade to Windows 8.1 or make the jump to Windows 10. Both are free upgrades for Windows 8 users at this writing. That may be problematic for some if you have an oddball PC that is no longer supported by a manufacturer ([go.pcworld.com/oddballPC](http://go.pcworld.com/oddballPC)) and thus missing drivers for a smooth experience. Other than that small minority of users, everyone else should dump Windows 8 as soon as possible.

If you're going from Windows 8 to Windows 8.1, remember that the upgrade happens via the Windows Store and not Windows Update.

### **The story behind the story:**

Windows 8 was supposed to be a revolutionary OS that had two different interfaces, built to run on both PCs and tablets. The idea was inherently flawed and it ultimately failed. Microsoft tried to improve the situation by adding features PC users wanted in Windows 8.1, but it really wasn't until Windows 10 that Microsoft's vision of a single OS running everywhere came to satisfying fruition.



## **IE goes to eleven**

Windows 8 is going to have some company in the dustbin of history. Microsoft plans to discontinue almost all support for Internet Explorer 8, 9, and 10. This issue only affects Windows 7 users who haven't upgraded to IE11, and Windows 8 users who must upgrade to Windows 8.1 or 10 to get the latest version of IE.


Everyone else—Windows 8.1 and Windows 10 users—already have

IE11 as it came built into their systems. In fact, Windows 10 users are barely affected since the built-in browser of choice for Microsoft's latest OS is the new Edge browser.

If you're a Windows 7 user with automatic updates enabled, then you should have IE11 already. To check which version you're running, open Internet Explorer, click the Settings cog in the upper right corner, and select About Internet Explorer. A pop-up window will appear with all the details you need.

If you can't be bothered to check, don't sweat it. A patch rolling out for Windows 7 will detect the version of IE you have and then continue to bug you until you upgrade.

The only exception to the end of IE versions 8 through 10 will be Windows Vista, which will continue to get support for Internet Explorer 9. IE9 was the last version of the browser built for the OS. But that support won't run for much longer. Microsoft will end support for Vista in April 2017, which means the OS will cease receiving security updates altogether—just like Windows 8 and XP.

Microsoft's latest round of security patches start rolling out Tuesday but may take a few days before they land on your system. 

If you're a Windows 7 user with automatic updates enabled, then you should have IE11 already.



# Swanky gaming PCs thrive in slumping computer market

BY AGAM SHAH

**IN A DECLINING** PC market, high-priced gaming desktops and laptops are thriving.

PC shipments totaled 71.9 million units during the fourth quarter of 2015, declining by 10.6 percent compared to the fourth quarter of 2014, according to a study recently released by IDC.

But high-end gaming PCs are the fastest-growing segment alongside all-in-one PCs, IDC analysts said. Gamers upgrade hardware much more quickly than other users and are typically not affected by



the industry trends that led to a decline in PC shipments overall.

For one, smartphones and tablets haven't replaced gaming PCs, as has happened with mainstream PCs, said Lewis Ward, research director for gaming at IDC.

Gamers also aren't price-sensitive, and are willing to spend to get the latest and greatest technologies. Many gaming systems are built by enthusiasts at home.

Gamers aren't price-sensitive, and are willing to spend to get the latest and greatest tech.

Though a small share of the overall PC market, gamers also upgrade computers much more quickly than users of regular PCs. Intel recently estimated that gamers refresh PCs roughly every two years. It also estimated that enthusiast gaming PC shipments are growing at about 26 percent per year.

IDC couldn't provide specific growth numbers for gaming PCs, but said it's a relatively small segment of the overall PC market.

Top PC makers Dell, Lenovo, Asus, and Acer are chasing the gaming market aggressively with tricked-up PCs. Lenovo is even writing its own game called Game State in order to break into the gamer market.

Virtual reality and augmented reality will likely aid the growth of gaming PCs, said Loren Loverde, vice president at IDC. Virtual reality headsets are usually attached to desktops with the latest graphics cards.

PC shipments otherwise declined due to fewer upgrades than expected. Sales in China, which is usually a source of PC growth, suffered along with its declining stock market.

IDC's survey didn't account for tablets with a detachable keyboard. Detachables are growing in popularity and the quarterly PC shipment decline would have been less steep had detachables been included in the numbers, IDC said.

But IDC has a positive outlook for the PC market this year, which will turn around as consumers and organizations upgrade to Windows 10.

PC shipments for the top three PC makers declined during the quarter. At the top was Lenovo, whose shipments totaled 15.4 million

units, a year-over-year decline of 4.5 percent and a 21.4 percent market share. HP was second, with its shipments declining by 10.1 percent to 14.29 million units. Third-placed Dell shipped 10.17 million units, declining by 5.7 percent. Shipments for fourth and fifth-placed Asus and Apple grew by 0.8 percent and 2.8 percent, respectively. 🔌

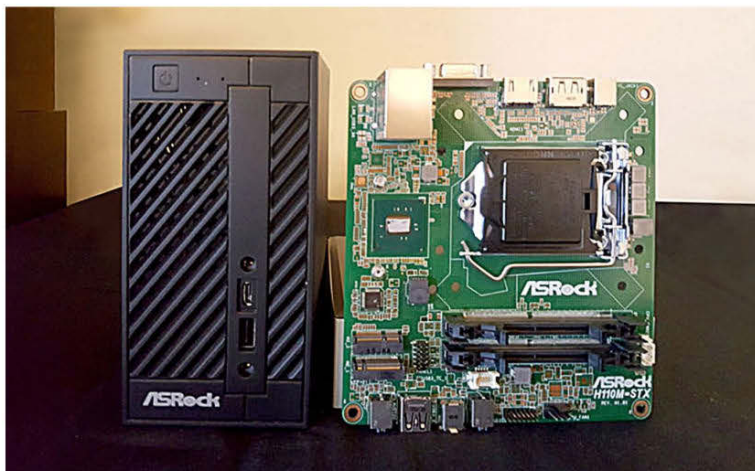


# The first PC hardware based on Intel's itty-bitty new mini-STX motherboards appears

BY IAN PAUL

INTEL'S ITTY-BITTY MINI-STX motherboards ([go.pcworld.com/mini-STXmotherboards](http://go.pcworld.com/mini-STXmotherboards)) are poised to become real in 2016. Several PC makers and component makers were at CES this year, showing off early concepts of how they plan to use the new motherboard design, from mini-PC concepts to cases and, of course, the motherboards themselves.

Intel first introduced the mini-STX in August, although it was christened “5x5” at the time to denote its size—generally 5 inches by 5 inches. This board is significant since it fills the gap between the Intel NUC and the mini-ITX form factor. It also allows you to switch out your CPU, unlike NUCs.



Mini-STX motherboards come with an LGA1151 socket, allowing you to pick and choose your Intel processor up to 65W TDP, similar to mini-ITX boards. But it's closer in size to the 4x4 NUC, and like the NUC, it lacks the space for a discrete graphics card. Intel says not to worry, though, as the company's integrated graphics are catching up to dedicated graphics cards ([go.pcworld.com/integratedgraphics](http://go.pcworld.com/integratedgraphics)). (All right, well call me when Iris Pro is running *Witcher 3* at 60 frames per second, Intel.)

The impact on you at home: It's easy to imagine mini-STX motherboards becoming popular for home theater PCs designed for video streaming and non-intensive games on Steam and the Web. The mini-STX form factor could also be a great option for anyone who doesn't need a powerhouse of a PC and needs to save a little space around their desk.

## The first mini-STX PC hardware

As for the products themselves, the most notable mini-STX action came from ASRock ([go.pcworld.com/ASRock](http://go.pcworld.com/ASRock)). The company was showing off its H110M-STX motherboard and the mini-STX building block PC, which are pictured at the top of this article.

ASRock says its mini-STX motherboard can support a standard desktop CPU fan, while competing boards don't. ASRock's mini-STX board—like other mini-STX mobos—can support your choice of a Skylake Core, Pentium, or Celeron processor using the Intel H110 chipset. It also has two SO-DIMM slots for DDR4 2133MHz RAM, VGA, HDMI, DisplayPort, and four USB 3.0 ports, including one Type-C.

ECS was also at CES with an engineering sample of a mini-STX board that Maximum PC ([go.pcworld.com/ECSministx](http://go.pcworld.com/ECSministx)) sneaked a peek at. The board, dubbed the H110SU-02, supports either the Intel H110 or B150 chipset, the same processors, and similar setups for USB ports and RAM.

Finally, case maker Silverstone had a basic black mini-STX PC case that Tom's Hardware took a look at. The case looked smaller than ASRock's, and Tom's Hardware ([go.pcworld.com/ministxcase](http://go.pcworld.com/ministxcase)) said it would probably have to rely on an external PSU as there's so little room in the box.

Be aware that all these mini-STX products are still in the early stages of development, however. We don't yet know when any of these mini-STX products are set to roll out or how much they'll cost. 📌

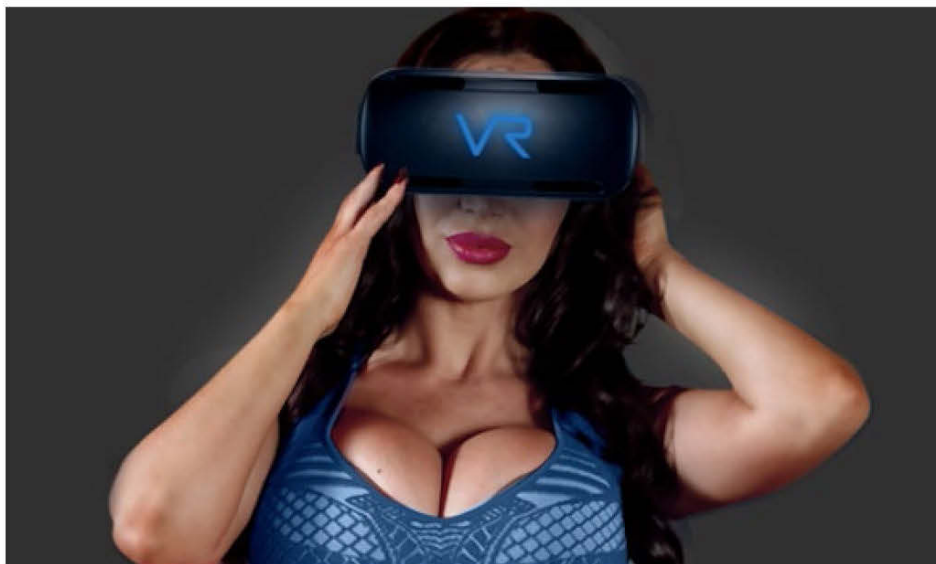


# Naughty America's virtual reality videos made me feel like a real-life porn star

BY BRAD CHACOS

**I'VE BEEN IMMERSED** in some compelling virtual reality experiences before. Heck, earlier this week, trying a Mount Everest demo on the HTC Vive ([go.pcworld.com/EverestVR](http://go.pcworld.com/EverestVR)) invoked my fear of heights to such an extent that I froze in terror for a long, long time. But I've never witnessed anything as, uh, stimulating as VR porn. And even if adult video isn't your thing, these pioneering videos have a lot to teach about how to craft films made for VR, as opposed to shoehorning your traditional film into VR.

Naughty America, one of the United States' largest adult film



creators, invited me to try their virtual reality experiences on a Samsung Gear VR at CES 2016, and how could anyone pass that up? But the experience wound up being far more vivid, personal, and immersive than my wildest expectations.

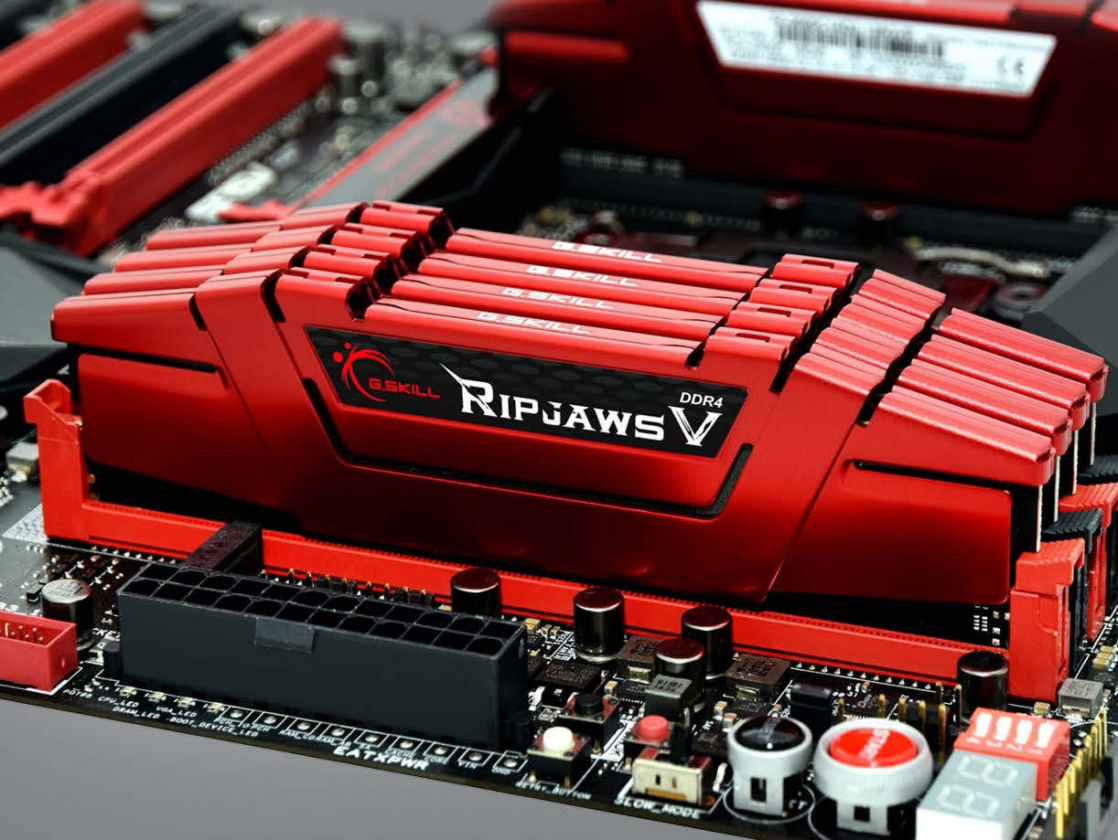
I won't get too detailed—we're a fairly family-friendly publication—but the films put you in the point-of-view of a man or woman sitting in a chair as performers, er, *interact* with your surrogate. The illusion's intensely compelling, and you can look wherever you'd like, at whatever you'd like. I found myself leaning back and looking up for certain scenes, leaning forward and looking down for others, and would swear I felt the performer's breath on my skin as she leaned in close. It's so incredibly realistic that I had to pause halfway through the demo to wipe steam off the Gear VR's lenses.

It's so incredibly realistic that I had to pause halfway through the demo to wipe steam off the Gear VR's lenses.

Part of what makes the experience so great is that Naughty America embraces the potential of the medium (though it's technically 180-degree immersive video, not VR, as you can't look behind you). As I said, your body is replaced with an actor's in the films, and the performers lean in to whisper things to you, wander out of the room for items, and work themselves into positions that require you to look around and bask in the VR experience. Naughty America CIO Ian Paul says the company's spent a lot of time and money in figuring out how to best choreograph and shoot a VR film, as well as educating performers how to play to the medium's strengths. Crafting virtual reality experiences also requires investing in special filming equipment, and Paul says upgrading to binaural audio seriously enhanced the experiences. (I concur.)

I found myself wishing for some sort of HTC Vive-like motion controller interaction during my experience, to interact with the scenes in some way, but Paul says Naughty America is currently keeping its adult VR films non-interactive to make them as widely compatible with as many devices as possible.

Virtual reality's on the brink of big success in 2016 according to many analyst expectations, and Naughty America's already pushing its way to the front. While Oculus Rift and HTC Vive have yet to hit the streets, you can already sign up for Naughty America's video subscription to experience VR porn on the Gear VR or any Android phone slotted into a Google Cardboard headset (though performance may vary with the latter). Even if adult films aren't something you're normally interested in, virtual reality porn is worth trying at least once. Just keep a wipe handy for those steamed-up lenses. 🔌



# G.Skill reveals a 128GB DDR4 memory kit clocked at a face-melting 3000MHz

BY BRAD CHACOS

**IF YOU LIKE** your RAM super-sized and face-meltingly fast, you'll definitely want to check out G.Skill's latest memory kit.

The newest member of the Ripjaws V lineup seems to check every possible box enthusiasts could ask for: It's 128GB of cutting-edge DDR4 RAM ([go.pcworld.com/allaboutDDR4](http://go.pcworld.com/allaboutDDR4)) clocked at a blisteringly fast 3000MHz, with ultra-low CL14-14-14-34 CAS latency times to top

things off. The set of eight 16GB sticks was built to complement quad-channel X99 (a.k.a. Haswell-E Extreme Edition, [go.pcworld.com/HaswellEExtreme](http://go.pcworld.com/HaswellEExtreme)) setups, and not just ones rocking the swanky \$1,000 Core i7-5960X either; the picture shows the 128GB Ripjaws V set nestled next to an Intel Core i7-5820K processor.

Memory kits only crossed the 64GB barrier in 2015 ([go.pcworld.com/64GBbarrier](http://go.pcworld.com/64GBbarrier)), and 3000MHz is almost twice as fast as the 1666MHz DDR3 RAM found in many people's PCs. G.Skill didn't announce pricing details even though the kit's due to launch by the end of the month, but don't expect it to go cheap. G.Skill's 128GB DDR4 memory kit ([go.pcworld.com/GSkill128GB](http://go.pcworld.com/GSkill128GB)) clocked at 2400MHz sells for a cool \$800, and there is far less competition at the lofty 3000MHz heights.

**The story behind the story:** OK, OK, this outrageous memory kit is clearly overkill for your average PC enthusiast. G.Skill's pitching it as an option for "content creation, 3D rendering, scientific calculation, or other professional applications." When we stuffed a PC with Corsair's 128GB Dominator Platinum DDR4 memory kit ([go.pcworld.com/Corsair128GB](http://go.pcworld.com/Corsair128GB)) we actually had a "what now?" moment when we realized that we didn't have any software on-hand to stress that much hardware—until we settled on creating a massive 100GB RAM disk with speeds that put even the most powerful SSDs to shame. The results were nothing short of glorious ([go.pcworld.com/ddr4results](http://go.pcworld.com/ddr4results)). 🔥

Memory kits only crossed the 64GB barrier in 2015, and 3000MHz is almost twice as fast as the 1666MHz DDR3 RAM found in many people's PCs.





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to be  
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# CONSUMER WATCH



## Microsoft fixes critical flaws in Windows, Office, Edge, IE, and other products

The company published 9 security bulletins covering patches  
for 24 vulnerabilities.

BY LUCIAN CONSTANTIN

PHOTO COURTESY OF MICROSOFT

**M**ICROSOFT HAS RELEASED the first batch of security updates for 2016, and they include critical fixes for remote code execution flaws in Windows, Office, Edge, Internet Explorer, Silverlight, and Visual Basic.

The company has also fixed remote code execution and elevation of privilege vulnerabilities in Windows, and an address spoofing flaw in Exchange Server, that were rated important, not critical, due to various mitigating factors.

In total, Microsoft issued 9 security bulletins ([go.pcworld.com/msbulletins](http://go.pcworld.com/msbulletins)) covering patches for 24 vulnerabilities.

According to Wolfgang Kandek, the CTO of security firm Qualys, administrators should prioritize the MS16-005 security bulletin, especially for systems running Windows Vista, 7, and Server 2008.

This patch addresses a remote code execution vulnerability tracked as CVE-2016-0009 that has been publicly disclosed, making attacks more likely.

The second most important bulletin, according to Qualys, is MS16-004, which addresses six vulnerabilities in Microsoft Office. This bulletin is rated critical, which has been unusual for Microsoft Office in the recent past.

The culprit for this severity rating is one particular remote code execution vulnerability tracked as CVE-2016-0010 that's present in all versions of Office from 2007 to 2016, even those running on Mac and Windows RT, Kandek said in a blog post ([go.pcworld.com/CVE-2016-0010](http://go.pcworld.com/CVE-2016-0010)).

Researchers from security firm Tripwire believe that the Internet Explorer and Microsoft Edge patches should be at the top of the priority list instead, because they address vulnerabilities that could be remotely exploited through malicious or compromised websites.

These patches are covered in the MS16-001 and MS16-002 security

This month's updates were also the last ones for Windows 8, which Microsoft will no longer support going forward.



bulletins and will be the last ones that Internet Explorer versions 8 and 10 will ever receive ([go.pcworld.com/lastIE8and10patch](http://go.pcworld.com/lastIE8and10patch)). IE 9 will continue to be supported on Windows Vista and Windows Server 2008 SP2.


“Many enterprises need to use older versions of IE within their environments because of very expensive, legacy web applications that use outdated technology,” said Lane Thames, security researcher at Tripwire, via email. “Organizations who still depend on legacy applications that require these older IE versions will need to move appropriately.”

Companies that use Outlook Web Access (OWA) should also prioritize MS16-010. Even though this bulletin is rated by Microsoft only as important, the vulnerability it covers can allow attackers to launch so-called business e-mail compromise (BEC) attacks.

Such attacks have cost companies around the world \$1.2 billion, according to statistics ([go.pcworld.com/BECattackcosts](http://go.pcworld.com/BECattackcosts)) published in August by the FBI’s Internet Crime Complaint Center (IC3). It involves attackers compromising business emails, or spoofing email addresses, to instruct employees and business partners to initiate unauthorized wire transfers.



Finally, the MS16-006 bulletin, which addresses a vulnerability in Silverlight, should be on the priority list as well because the flaw could enable remote code execution attacks through the browser plug-in. Attackers are known to have used Silverlight exploits in the past.

January’s updates were also the last ones for Windows 8, which Microsoft will no longer support going forward. Windows 8 users will have to upgrade to Windows 8.1 or 10 in order to continue receiving security patches. 

# Why finding a better ISP is harder than it should be

BY LINCOLN SPECTOR

**THE UNITED STATES** doesn't have the world's worst Internet access by a long shot. But the country that invented the Internet has fallen well behind other wealthy democracies in online access. According to one report ([go.pcworld.com/accessspeed](http://go.pcworld.com/accessspeed)), a resident of Washington, D.C., will get only

26.42Mbps of download speed for \$50 a month. In London, that same price brings 78.70Mbps. In Hong Kong, 302.61.

So what's our problem? According to Susan P. Crawford, author of *Captive Audience: The Telecom Industry and Monopoly Power in the New Gilded Age*, it's unregulated monopolies. DSL has become too slow for modern uses (such as streaming video). In most neighborhoods, the only other option is your local cable provider, who has to compete with no one. "The monopoly power of local cable incumbents over wired access is striking. The big cable players, Time Warner Cable and Comcast, never enter each other's territories," she told the New York Times in a 2013 interview.

ITU offers an interactive chart ([go.pcworld.com/ITUchart](http://go.pcworld.com/ITUchart)) that graphically shows how the US fell behind in penetration. In 1999, we pretty much led the world in what little broadband there was. But South Korea leaped ahead of us the next year. By 2013 (the last year



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ROWS OF DATA CRUNCHED TO HELP SAVE YOU TIME AND MONEY

on the graph), France, Germany, Canada, and several others had passed us by. We continued to gain subscriptions, but other countries gained faster.

So what can you do about it (aside from moving overseas or complaining to Congress)? You can check to see whether you actually do have multiple options. Go to [broadbandnow.com](https://broadbandnow.com) and enter your zip code. You'll find the ISPs serving your area, with their cheapest and slowest options displayed, plus other information available with a few clicks.

But check the fine print, even on Broadbandnow. The displayed price may be good only for a limited time. 🔌



# Why stolen laptops still cause data breaches, and what's being done to stop them

BY JONATHAN KEANE



**EVERY TIME A** stolen laptop leads to a data breach, you wonder why the business involved hadn't set up any safeguards. When the unencrypted laptop was stolen from a former physician at the University of Oklahoma, for instance, or when a laptop was stolen from insurance provider Oregon Health Co-op containing data on 15,000 members.

You'd think money would motivate them, if nothing else. In November, EMC and Hartford Hospital were ordered to pay US\$90,000 to the state of Connecticut over the theft of an unencrypted laptop in 2012 containing data on nearly 9,000 people. The laptop was stolen from an EMC employee's home.

The problem extends far beyond the healthcare industry, too—such as the laptop stolen from SterlingBackCheck, a New York-based background screening service. The laptop contained data on 100,000 people.

These types of breaches don't quite grab the same headlines as major cybercrimes and hacking incidents, if only because a thousand employees affected by a laptop theft is less dramatic than 40 million customers at Target. But it's a lot easier to steal a laptop than it is to hack into a corporate database, so the theft and loss of laptops, as well as desktops and flash drives, highlight the need for enhanced physical security and employee training.



## It's easier to steal a laptop than to hack a database

The organizations mentioned here have wised up. A spokesperson for the University of Oklahoma said it has launched an encryption program and new training for employees when it comes to handling sensitive data.

SterlingBackCheck said it has updated its encryption and audit procedures, revised its equipment custody protocols, retrained employees on privacy and data security, and installed remote-wipe

software on portable devices.

Another threat to your data is the proliferation of Bring Your Own Device (BYOD) policies and mobile workers. Gartner anticipates that half of all companies will have some need for a BYOD policy by 2017. Workers will be using their own devices as well as company-issued ones in the office or on the go. This opens up a new risk if devices are lost or stolen.

Security firms like Sophos urge companies to put a robust policy in place for the handling of professional devices, including full disk encryption as well as encrypted cloud and removable media. A strong password is highly recommended too, but it's not enough on its own.

A greater sense of urgency wouldn't hurt, either. In Oklahoma, the physician had actually left his position at the university before his personal laptop went missing. He couldn't say for sure whether it contained sensitive data, but by the time that possibility arose, it was too late.

In another incident, at manufacturer Tremco, an employee lost a company-issued laptop on a plane. It was several weeks before the employee realized that it contained spreadsheets of personal employee data.

Another threat to your data is the proliferation of Bring Your Own Device (BYOD) policies and mobile workers.

## **Encryption, remote wiping, better data tracking**

Companies need to know where their data is at all times—not just what device it is on, but where that device is located physically.

This highlights the need for remote wiping tools, which SterlingBackCheck has put in place. If a laptop is lost or stolen, the company should have an easy way to remotely wipe the sensitive data to ensure it never leaks.

Much like large-scale hacking attacks, it's the consumer or the patient that really suffers when a data breach occurs. The onus lies with the company to handle this data responsibly, whether it's in the cloud or on a laptop on the bus. 🔒



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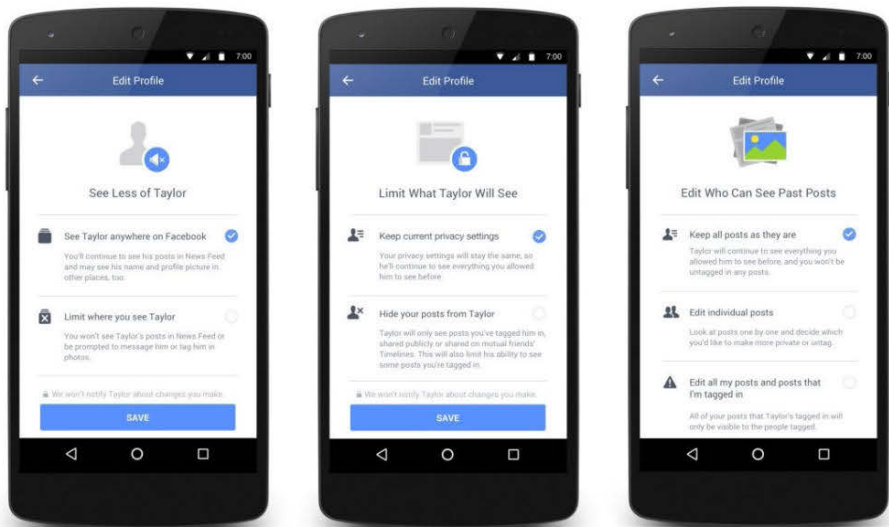


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Nick Jonas,  
Think It Up Ambassador



# New Facebook tools help you manage awkward romantic breakups


BY JON PHILLIPS

**WOW, FACEBOOK IS GETTING** downright emo. In a recent blog post ([go.pcworld.com/fbbreakups](http://go.pcworld.com/fbbreakups)) titled “Improving the Experience When Relationships End” (and, no, that’s not a Morrissey song), Facebook introduced features that mitigate the awkwardness of breakups in the social media age.

If you’ve ended a romance in the last seven or eight years, you probably know that “it’s complicated” barely begins to describe the weirdness of seeing your ex’s posts in your news feed—or knowing

that he or she can see yours. The new tools address all that. Once you change your status to single, Facebook's emotional-insulation agents come to the rescue.

One tool lets you see less of a former flame in your news feed without fully blocking them or unfriending them. And it goes the other way: You can also limit the photos, videos, and status updates that appear in your ex's feed. You can even edit how you're tagged in photos. And so on. It basically lets you sever ties, without, you know, fully breaking up and actually *unfriending* the other person.

Because you won't give Taylor that satisfaction. Because Taylor may still love you. Because unfriending is so...final. Right? 

Once you change your status to single, Facebook's emotional-insulation agents come to the rescue.



# Trend Micro flaw could have allowed attacker to steal all your passwords

BY JEREMY KIRK

**A DISCOVERY BY** a well-known Google security researcher provides further proof how antivirus programs designed to shield computers from attacks can sometimes provide a doorway for hackers.

Tavis Ormandy ([taviso.decsystem.org](http://taviso.decsystem.org)), an information security engineer with Google, wrote ([go.pcworld.com/ormandypost](http://go.pcworld.com/ormandypost)) that he found bugs in Trend Micro's antivirus product that could allow remote code execution by any website and steal all of a user's passwords.

The security firm has confirmed it has released an automatic update

that fixes the problems.

“As part of our standard vulnerability response process we worked with him to identify and address the vulnerability,” wrote Christopher Budd, global threat communications manager at Trend Micro, in an email on Monday. “Customers are now getting protections through automatic updates.”

Ormandy posted emails ([go.pcworld.com/ormandyemails](https://go.pcworld.com/ormandyemails)) he exchanged with Trend officials, occasionally expressing his frustration that the company wasn’t moving fast enough.


“So this means anyone on the internet can steal all of your passwords completely silently, as well as execute arbitrary code with zero user interaction,” Ormandy wrote. “I really hope the gravity of this is clear to you, because I’m astonished about this.”

Trend’s antivirus product has a password manager, and users can elect to export their passwords to it. The password manager is written in JavaScript and opens up multiple HTTP remote procedure call ports to handle API requests, Ormandy wrote.

In 30 seconds, Ormandy wrote he found one that would accept remote code. He also found an API that allowed him to access passwords stored in the manager.

Overall, Ormandy wrote that he found over 70 APIs exposed to the Internet, not all of which he had investigated for security issues. He suggested Trend should hire an external consultancy to audit the code.

Antivirus applications run with high-level privileges on operating systems, which means that exploiting a vulnerability can give an attacker deep access to a computer.

Dozens of serious vulnerabilities have been found ([go.pcworld.com/antivirusvulnerabilities](https://go.pcworld.com/antivirusvulnerabilities)) in the last seven months in antivirus products from vendors including Kaspersky Lab, ESET, Avast, AVG Technologies, Intel Security (formerly McAfee), and Malwarebytes. 

Dozens of serious vulnerabilities have been found in the last seven months in antivirus products.



You might know **Joshua**.  
He loves video games, and he  
owns enough to know they're not  
all meant for kids. That's why he  
reminds his friends (at least the  
ones that have kids) that they all  
have **big black letters on the box**  
to help parents find the ones that  
are best for their families.

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# REVIEWS & RATINGS

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# MSI GT72S Dragon: What it takes to get a laptop to game like a desktop

BY GORDON MAH UNG

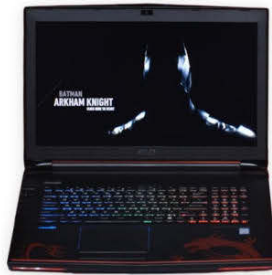
**M**SI'S **GT72S DOMINATOR PRO G DRAGON** breaks barriers unheard of just a few years ago by offering desktop-class CPU performance, desktop-class storage performance, and desktop-class graphics performance in a laptop.

The attention-grabber here is the use of Nvidia's new GeForce GTX 980 chip, which promises 1:1 performance of the desktop GeForce GTX 980. Yes, really. No joke.

If you need it explained in pictures,  
it's like Nvidia took this:



and jammed it into this.  
Bam!



Don't yawn, you cynical gamer. Sure, we've been able to get GeForce GTX 980M graphics chips all year long, but that part has only 75 percent of its desktop counterpart's power. With the confusingly named GeForce GTX 980 mobile chip ([go.pcworld.com/GTX980](http://go.pcworld.com/GTX980)), it's true desktop performance at last.

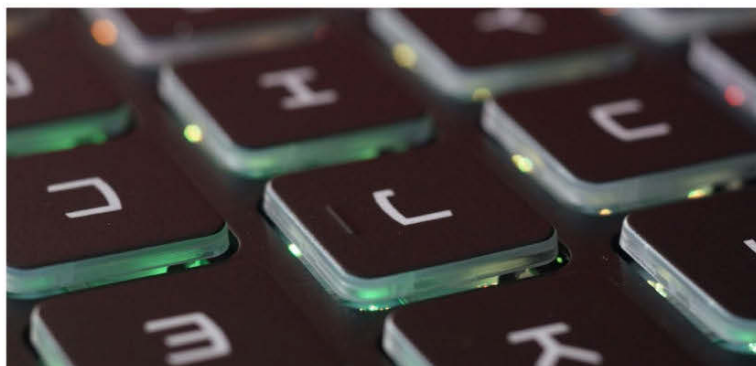
Before we dive into performance, more on this striking Dragon. It might seem like just a reissue of the older GT72 Dominator. There's one big difference on the outside: The dragon on the lid of the laptop casts a glowing eye when the laptop is powered on. It's a big upgrade over the rather sedate, black lid of the older GT72 Dominator.

A redesigned keyboard makes the keys brighter. Those keys, unfortunately, are still just zone-lit—MSI officials cited the cost and power consumption of a per-key RGB setup. The keyboard uses standard dome keys—if you want mechanical keys, you'll have to pony



### **Enter The Dragon.**

MSI's GT72S Dominator Pro G Dragon features a, well, red dragon on its aluminum lid with an eye that glows when on.



**The keyboard is** changed from last year's GT72 to even brighter than before. It's still just zone lighting though rather than per-key lighting.

up for the GT80 Titan SLI ([go.pcworld.com/GT80Titan](http://go.pcworld.com/GT80Titan)).

The keyboard was fine, but I'm still no fan of the buttons on the trackpad. They just take too much pressure for your thumb to activate. I found myself using my off hand's index finger to click the trackpad's buttons after my thumb became tired.

Inside you'll find other key changes. The GT72 Dominator featured two miniDisplayPorts and HDMI outputs. The GT72S Dragon trades one mDP for a Thunderbolt 3.0 combo USB-C port.

For storage you get a 1TB hard drive and an LG Blu-Ray burner with

M-Disc support ([go.pcworld.com/M-Discsupport](http://go.pcworld.com/M-Discsupport)). The primary drive is pretty exotic: a pair of Samsung SM951 M.2 PCIe drives in RAID 0. The two drives combined can cook off sequential transfers speeds, with large queue depths up to 2.8GBps reads and 1.3GBps writes in CrystalDiskMark 5. The only minus? The drives are a measly 120GB each.

## Overclocking-ready CPU with all the trimmings

Inside the shell of the GT72S Dragon you'll find an Intel quad-core Skylake Core i7-6820HK ([go.pcworld.com/Corei7-6820HK](http://go.pcworld.com/Corei7-6820HK)) chip. The CPU is unlocked, but the factory default is 2.7GHz to 3.6GHz on Turbo-Boost.

Rather than the fancy whiz-bang UI that desktop motherboards get, the GT72S Dragon's BIOS looks like it was lifted from a motherboard from 2001. There's no mouse control, no print screen option and nothing to walk you through your overclocking attempts. It's bare-bones. I'd expect this to improve if overclocking of laptops actually turns into a thing.

For my tests I dialed up a quick overclock to 4GHz from its stock speed of 3.2GHz. Even with the 4GHz overclock, the CPU fan speeds didn't get obtrusive. Only under a stress test do the fans get up and go. Overall, I'd say fan noise on the GT72S was kept to a minimum.

Because it's Skylake, MSI pairs the CPU up with an excessive amount of DDR4/2133 RAM using four DIMM slots. By excessive I mean few people really need 32GB—but hey, why not go all in right?

## G-Sync display for smoother gaming

The GT72S Dragon features a G-sync certified panel. The problem, of course, is that with the 17.3-inch 1920x1080 IPS screen and the GeForce GTX 980, it's going to be really hard to get frame rates to drop to

### Microstar/MSI MSI GT72S Dominator Pro G Dragon

#### PROS

- Desktop graphics performance
- Overclockable Skylake CPU
- G-sync monitor helps smooth out low frame rates

#### CONS

- Thumb buttons on trackpad difficult to push
- Expensive, and most don't need 32GB of RAM

\$3,100

★★★★★

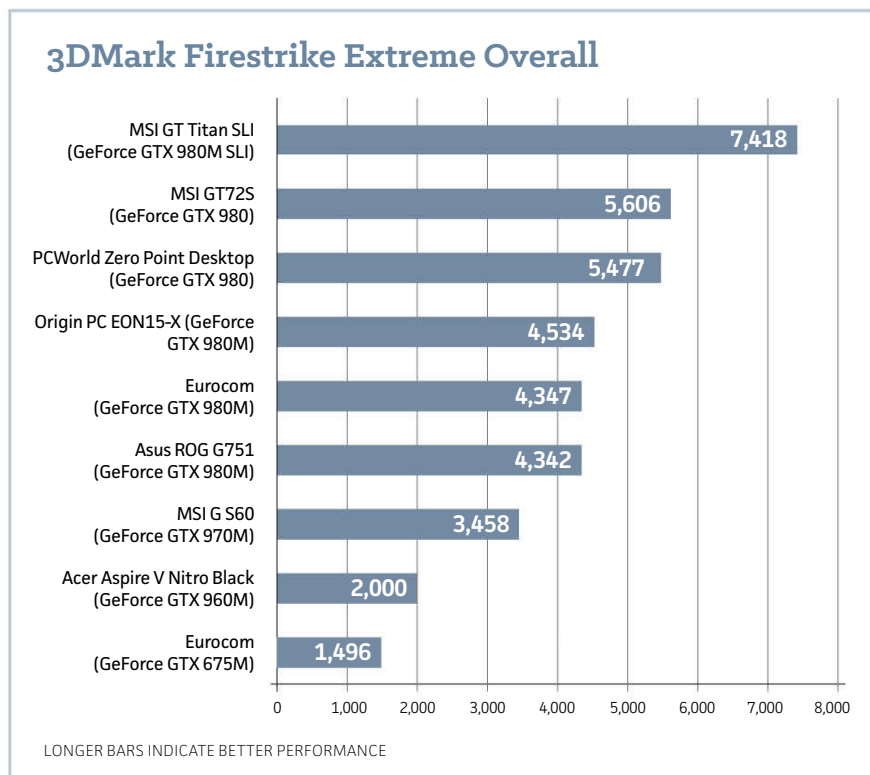
the 30 and 40 fps range where G-sync is the most effective.

There are benefits: For example, the G-sync panel is rated for 75Hz, so you'll get a slightly smoother feel in gaming and even scrolling or moving windows around. It's not quite to the level of a 120Hz or 144Hz panel, but it's better than 60Hz.

G-sync also brings anti-ghosting and even works in a window, but the truth is it's hard to drag down a GeForce GTX 980 even at 1080p gaming.

## GPU Performance

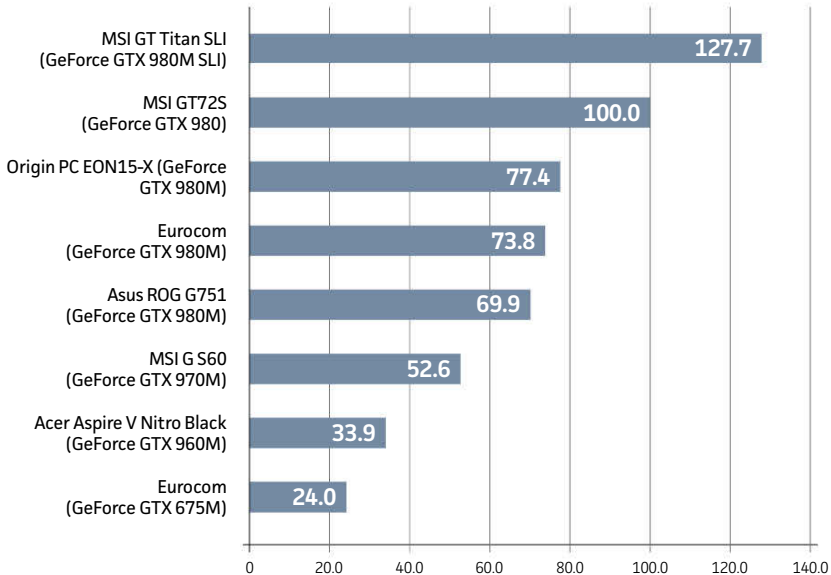
None of the fancy Dragon stuff matters if the laptop doesn't deliver, and it does. I ran 3DMark Firestrike Extreme on the GT72S Dragon and



**Does the laptop** GeForce GTX 980 stack up to a desktop GeForce GTX 980? Yup.



## Tomb Raider Ultimate 1080p (fps)



LONGER BARS INDICATE BETTER PERFORMANCE

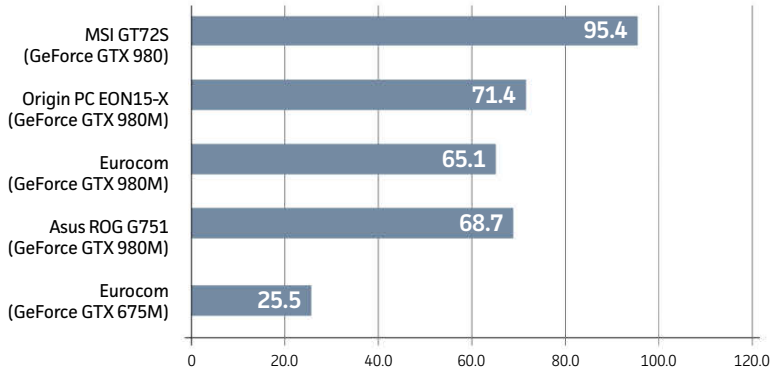
**Here's how** the MSI GT72S Dragon stacks up in a real game.

compared it to some beefy laptops plus our PCWorld Zero point desktop system with a GeForce GTX 980. The result? The Dragon is actually slightly faster than our desktop system.

To see how the part stacks up in a real game, I also ran *Tomb Raider* set to Ultimate quality and at 1920x1080 resolution. I unfortunately don't have our Zero Point at the lower resolution handy, but the only laptop that we've seen with more performance is one with two GeForce GTX 980M cards in SLI.

I also threw *Middle-earth: Shadows of Mordor* with the 4K texture pack and Ultra-quality setting enabled. I have a somewhat smaller set of comparison numbers here, but the GeForce GTX 980 easily schools the GeForce GTX 980M chips.

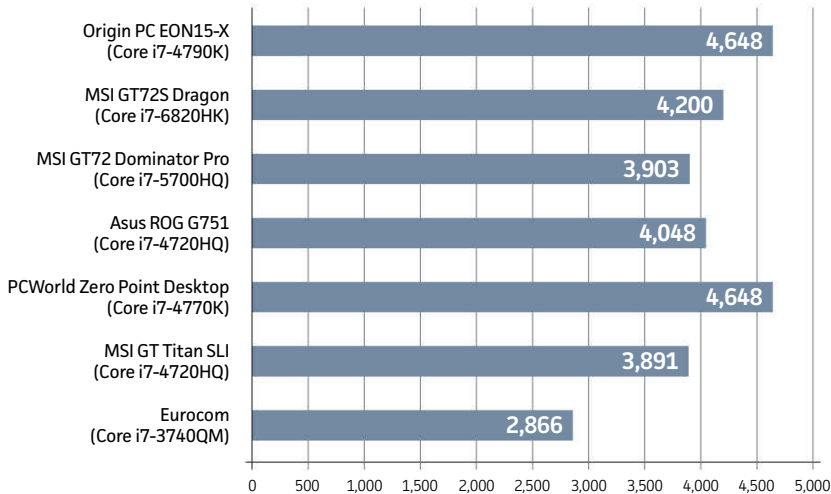
## Middle-earth: Shadow of Mordor 4K Textures and Ultra Quality at 1080p (fps)



LONGER BARS INDICATE BETTER PERFORMANCE

The **MSI GT72S Dragon** performance in *Middle-earth: Shadows of Mordor* is also top notch.

## PCMark 8 Home Conventional



LONGER BARS INDICATE BETTER PERFORMANCE

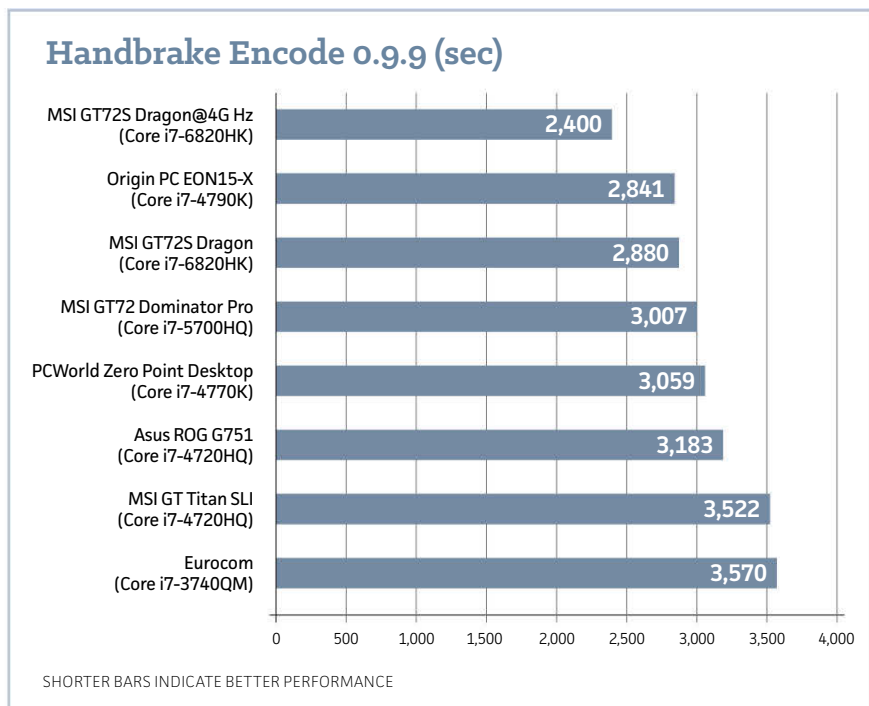
**PCMark 8 Home** measures low ambition gaming and general CPU performance in typical home (yawn) tasks.

## CPU Performance

We all know gaming laptops do more than play. People who buy these honking big laptops also tend to edit video, photos, or do other content creation-oriented tasks.

The first test is PCMark 8 Home Conventional. It's a synthetic benchmark designed to measure typical usage in a "home" environment and includes browsing, video editing, photo editing, word processing and light-duty gaming. It's a fairly easy test that any machine can do, but it favors the higher clock speeds like the desktop chips in our zero-point testbed and the Origin PC EON15-X ([go.pcworld.com/OriginPCEON15-X](http://go.pcworld.com/OriginPCEON15-X)).

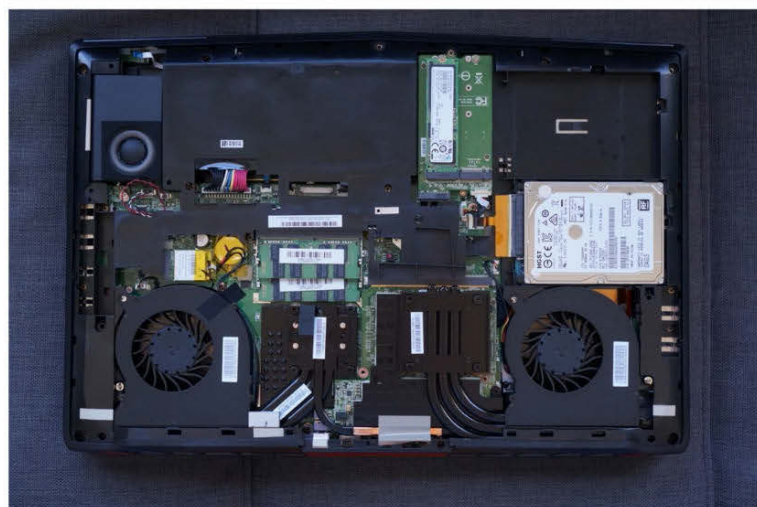
A more strenuous workload is our Handbrake encode test. We take a



**The default clocks** of the GT72S Dragon's Skylake chip is a tad slow but overclocked to 4GHz, it'll school even a desktop chip.

**The MSI GT72S Dragon** is well vented and generally fairly quiet except under the most extreme GPU loads.

**Access to the guts** of the MSI GT72S Dragon is just seven screws away—provided you're not afraid of voiding your warranty.



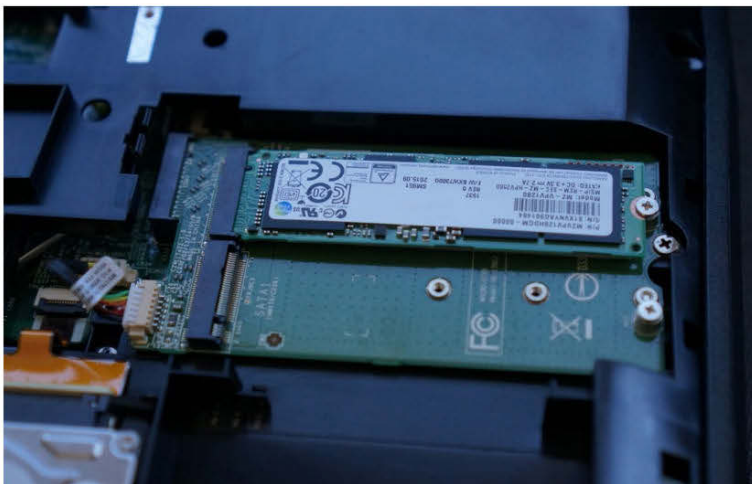
30GB, high bit-rate 1080P MKV file and encode it using the Android Tablet preset. Handbrake is heavily multi-threaded: The more cores, the higher the performance. On the GT72S Dragon, I ran the test two ways. The first was at the stock speeds for the chip, and the second was with the laptop's CPU overclocked to 4GHz. The results are impressive.

If you look at the Handbrake chart, you can see the Skylake chip turns in a better performance than the Core i7-4770K in our Zero Point desktop box. However, it loses to the Origin PC EON15-X with its higher-clocked Devil's Canyon chip. With the 4GHz overclock on the Skylake chip, we see a large performance increase over the other quad-core CPUs. Note that I didn't vet the 4GHz overclock for long-term stability, just to see how fast it would run. My guess is it's an attainable overclock, as it was fully stable during multiple 40-minute encode runs.

## Let's look inside

I don't typically take apart review laptops, but the GT72S Dragon was too intriguing to pass up. To open up the GT72S Dragon, just remove the perimeter screws along with the one under the warranty sticker (a hint?), then carefully pry off the lid.

On the previous page is the actual inside of the GT72S Dragon. It's fairly straightforward, with easy access to most of the components. The laptop actually uses four 8GB DDR4 SO-DIMMs, so I'm guessing the other pair is embedded on the other side of the motherboard. The GeForce GTX 980 is under the cooler on the right in an MXM module



**MSI uses an** interesting daughter card that I believe mounts up to four M.2 drives on it.



**This a very nice touch:** The 8 lbs. 9 oz. GT72S Dragon comes with a backpack capable of swallowing the laptop and all your gaming gear needs too.

while the Core i7-6820HK is soldered to the motherboard on the left. And no, you can't swap the CPU out, as Intel stopped making CPUs for laptops using sockets beginning with the mobile Broadwell CPUs.

There's one other gut shot (page 67) that's really worthy of getting detail on, and that's the storage subsystem. MSI actually uses a small daughtercard to mount the M.2 drives to. I didn't disassemble it any further, but I believe up to four M.2 drives can be mounted to it. That means up to four M.2 drives in RAID 0 performance for even more over-the-top read and write speed.

## Is it worth it?

There's no question the GT72S Dragon is kick-ass in performance. You're getting pretty much desktop-level performance without any compromises in gaming, compute, and storage. It's also not very cheap: The configuration I received notches \$3,100 into your credit card. That price will have every single desktop user chiming in and saying: "It ain't worth it, just buy a desktop."

Even if we bought into the narrative that there's simply no value to a powerful gaming laptop that can be zipped up into the included backpack (thanks MSI!) in 60 seconds, we'd need benchmarks to know the truth.

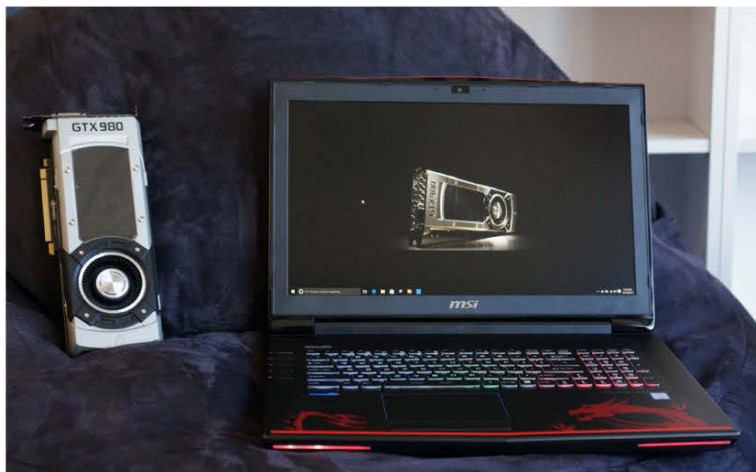
I went to [PCpartpicker.com](http://PCpartpicker.com) and spec'ed out a similar gaming PC. I didn't pick low-end components such as a \$50 case or \$4 power supply, but I didn't pick over-the-top components either. That desktop cost? Roughly \$1,729 including the OS. That includes an OCZ Revo PCIe card, which is actually slower than the pair of M.2 drives in the MSI but about the only comparable thing I could find in the same capacity range. Also note the GeForce GTX 980 I picked—an MSI one—packs only 4GB instead of the 8GB that the laptop's GPU has. There are actually no 8GB GTX 980 cards I could find. You can see my build here ([pcpartpicker.com/p/2L9YvK](http://pcpartpicker.com/p/2L9YvK)).

But wait: That's just for the PC itself. With a gaming laptop, you're also getting a monitor, a keyboard, a mouse, and speakers. In the GT72S Dragon's case, it's not just a cheap monitor either, it's an IPS G-sync panel. That might add another \$500 on a new PC. Once you toss in a good gaming keyboard for \$100, and a pair of speakers or headset for \$50 plus a mouse and webcam you're up to roughly \$2,500 for a complete system with somewhat equivalent specs.

That means the price premium for the GT72S Dragon is around \$600. Is it worth it? No, not if you never place any value on portable gaming performance. If you just never bring your rig to a friend's

### **Impressive:**

You get every bit of performance of the GeForce GTX 980 card on the left inside a semi-portable laptop.





house on a whim (which you can do with a gaming laptop) or with you on a weekend trip, then no, why buy a gaming laptop? Get a desktop.

But if you are the kind of person who does need gaming you can take with you on a month-long trip or an overseas deployment, then the price premium is well worth it.

Are there improvements to be made? Sure. As neat as it is to see 32GB in a laptop, I'd shave that in half for the savings because the vast majority of people just don't need 32GB of RAM. While under a normal GPU load or even

overclocked to 4GHz, the GT72S Dragon fan noise was reasonable—but on occasion, especially when coming out of standby, the fans would run at a loud full speed for a few seconds. And yeah, those trackpad buttons. I imagine the factory technician who calibrated them could lift a Buick with her thumbs if these felt normal to her.

If you can overlook those faults, what you're getting with the GT72S Dragon is truly desktop performance in a laptop. 🔌

As neat as it is to see 32GB in a laptop, I'd shave that in half for the savings because the vast majority of people just don't need 32GB of RAM.

# Gaming mice: We test the best

BY HAYDEN DINGMAN



**YOU KNOW IF** you need a gaming mouse. You're not pushing virtual paper around on your desktop; you're fragging bots and shooting zombies.

## Seeing how they run

It was brutal work, but we've put a small herd of gaming mice through their paces. Everything from ultra-budget to ultra-customizable to ultra-small to ultra-packed-with-buttons is in the running here, and then some.

## Continued: **Gaming Mice** roundup

What paces, you ask? First, we assess its skills in general use and gaming—from browsing Reddit to video editing to perusing Spotify to playing through *Fallout 4* and *Star Wars Battlefront*.

We also consider the preferred grip. How do you grip your mouse? It's probably not something you think about consciously—like which sock you put on first or whether you hang your toilet paper over or under. But it's important.

People largely fall into three different grip types: Palm, Claw, and Fingertip.

**Palm Grip:** This is probably the most common grip, and it's what most mice are designed for. Your entire hand makes contact with the mouse at the same time, with your arm driving most of the movement. This is the most ergonomically comfortable grip, with the mouse shaped specifically to fill and complement your palm.

**Claw Grip:** Claw grippers arch their fingers more, creating separation between the hand and mouse but keeping the fingertips and rear of the palm in contact. This allows for quicker button pressing and slightly quicker movement, but puts more strain on your wrists.

**Fingertip Grip:** The most agile grip also puts the most strain on your wrists. Fingertip grip, as the name implies, involves guiding the mouse with only your fingertips—no palm contact at all.

We've essentially merged the Claw/Fingertip Grips, because generally a mouse that works for one will work for the other. The main distinction is between Palm and Claw grips.

Everything from ultra-budget to ultra-customizable to ultra-small to ultra-packed-with-buttons is in the running here, and then some.

### Other things to look out for

**Button count:** You'll pretty much never find a three-button gaming mouse. Even the budget-friendly devices we've tested have five to ten buttons. The award for Most Buttons goes to the Roccat Tyon this time around, with 14.

**Sensor:** *Dots per inch*, or DPI, is a measure of how many pixels the


mouse moves onscreen per each inch of desk you move it across. Some people prefer to make large, sweeping motions with a lot of precision, necessitating a low DPI. Others want fast, jerky motions that start and stop on a dime—high DPI. The latter group will want to pay particular attention to each mouse's limit.

At this point, the DPI arms race has become largely meaningless. Manufacturers push numbers that are so high as to be impractical for most people's day-to-day use. Is that 16,000 DPI mouse actually more useful to you than the 12,000 DPI mouse? Probably not.

**Shape:** There are three main categories here, too: right-handed, left-handed, and ambidextrous.

We've looked at right-handed and ambidextrous mice because I am—you guessed it—right-handed. Some right-handed mice (such as the DeathAdder) have left-handed variants, but these are a rarity. Most southpaws will probably end up with an ambidextrous mouse, like the G-Skill Ripjaw MX780 or the Razer Diamondback.

## The contenders

Let's get to it. We'll keep updating this story at [PCWorld.com](http://PCWorld.com), with new products, so let us know if we've missed a personal favorite—we'll try to get it in for testing. 



## Razer Diamondback: A classic returns to life with a hefty price tag

BY HAYDEN DINGMAN

**LONG AGO, BEFORE** the Naga and the Mamba and the DeathAdder, there was the Razer Diamondback. A relic from another age (2004), the Diamondback was a gaming mouse when the concept of a “gaming mouse” was still kind of an oddity. It came, it saw, it conquered, and then in 2007 it disappeared.

But people spoke of a return, of a second coming of the Diamondback, of a redemption story the likes of which could be sold to Hollywood. It's here. 2015, the Diamondback is back. And it's... well, it's pretty okay.

### **Tubular**

If there's one thing that's likely to sell you on the Diamondback, it's the shape. And for good reason: There is literally no other mouse I can think of with the Diamondback's form factor. It's downright strange.

Pretty much every mouse on the planet fits one of two molds: Either it's a symmetrical egg shape (for claw grippers) or it's fatter

and vaguely hand-shaped (for palm grippers). Or, if you're somehow reading this article from the year 1997, there are also Apple's stupid iMac hockey pucks.

The Diamondback is unique: A mouse that's long and symmetrical and skinny. It feels almost like a palm-grip mouse with the right half lopped off, resulting in some sort of palm/claw grip hybrid. The end is far enough back to press into your palm, but you'll need to pull your pinky in from the side to grab onto one of the textured underside cut-outs.

It's weird—but also weirdly comfortable, for a while. If you can finagle your fingers into the right position, there's a lot to like about the Diamondback. It's ultra-light and glides very smoothly side-to-side, presumably because there's less horizontal surface-area to drag.

I did find myself needing to take more frequent breaks with the Diamondback, though—and this coming from someone who already rocks an ambidextrous mouse and claw grip day-to-day. There's just no getting around how thin the Diamondback is, and I found myself getting hand cramps after two or three hours of use.

Aside from the shape, it's a pretty standard Razer mouse: Seven buttons (left, right, middle, two on the right side and two on the left), matte black plastic, braided cable sheathe, Razer logo emblazoned on the rear, 1,000Hz polling rate, and a 16,000 DPI sensor. You know, for if your mousepad is the size of a postage stamp.



## Continued: **Gaming Mice** roundup

### A few differences:

**1. The buttons are...buttons.** Razer's other devices (the Mamba, the DeathAdder) have a tendency to build the top out of one single molded piece of plastic. The Diamondback has distinct left and right mouse buttons, with ever-so-slightly more resistance as a result. It feels more solid than the DeathAdder.

The side buttons are also much smaller than you'll find on any other Razer mouse—both horizontally and vertically. They're easy to find though, whether predominantly a palm- or claw-gripper, and extremely easy to press.

**2. The scroll wheel is loud.** Scrolling forward, it's particularly susceptible to "quacking," and it can be distracting if you're making quick back-and-forth motions (e.g., to swap through weapons). It's also stepped very aggressively, with higher-than-average friction and up-front resistance.

**3. The lighting.** Oh wow, the lighting. Sure, 16.8 million color RGB lighting on a mouse is decorative more than functional. We all know that.

The Diamondback is one beautiful piece of hardware though—probably the best RGB-enabled mouse I've seen. Apart from the standard scroll wheel and logo lighting, Razer's built a channel that stretches from the front-left back around the rear and up to the front-right of the mouse. It's very similar to the Roccat Kone XTD, but a bit cleaner in my opinion. You can set up custom lighting in Razer's Synapse software, of course, but even the default rainbow cycle is stunning.

### The price

I have one enormous issue with the Diamondback: The price. Everything else—the look, the feel—that's all a matter of taste, and all I can do is offer suggestions and try to make my own preferences clear.

But the price. Razer is selling the Diamondback for

### Razer Diamondback

#### AT A GLANCE

After eight years in the shadows, Razer brings back the Diamondback's tubular shape—with a few upgrades.

\$90






\$90. Yes, ninety dollars. That's an amount I'd be hesitant to pay for any mouse, even if it were decked out with all sorts of fancy features. The Diamondback isn't even that fancy—it's just your standard ambidextrous mouse with some cool lighting.

I'm sure it's that latter bit—and the Diamondback's reputation—that makes Razer think it can command such a premium price, but I'm not sure it earns it. It's certainly not a better mouse than Logitech's G502 Proteus Core ([go.pcworld.com/G502ProteusCore](https://go.pcworld.com/G502ProteusCore)), which is my absolute favorite and runs for "only" \$80 normally.



## Bottom line

I don't know why the Diamondback went away, and I don't really know why it returned. But it's back, and in a world full of "me too" gaming peripherals the Diamondback's unique shape still stands out. It's probably the most wholly unique mouse in this roundup, and that deserves its own special recognition.

Just be wary of that \$90 sticker price. You could get a whole lot of mouse for a whole lot less money, so you'd better have your heart set on the Diamondback before shelling out. 

## Razer DeathAdder Chroma: The most popular gaming mouse gets a bit brighter

BY HAYDEN DINGMAN



**IT ALMOST FEELS** useless to write anything about the DeathAdder because chances are you already know whether or not you want it. Razer's signature gaming mouse is one of the most pervasive, iconic peripherals of the last decade. It is, for a lot of people, *the* gaming mouse.

Me? I think it's pretty average. And I don't mean that in a bad way. There are no significant disadvantages to the DeathAdder. It is the ultimate no-frills, jack-of-all-trades Razer mouse. It's the vanilla milkshake or the peanut-butter and jelly sandwich. It's the Top 40 pop song or the Toyota Camry.

It's a workhorse—a mouse that would serve 90 percent of the population well, and one you'd be happy to own. There just might be something out there that works *better*. Something more niche.

### The every-hand

*No frills.* The DeathAdder is about as bare bones as a gaming mouse gets these days, with only five buttons—left, right, and middle mouse/scroll, plus two under the thumb. The latest Chroma edition is equipped with a braided cable sheathe, 10,000 DPI sensor, and the

now-standard 1000Hz polling.

That's it! It's a simple mouse with simple aims, and it's all the better for that. If you're a person who wants a gaming mouse that just works, the DeathAdder is your safest bet.

Especially because it's comfortable as hell. There's a reason the DeathAdder, despite its seemingly simple design, became such an icon: It's beautifully sculpted, with some of the most comfortable right-hand contours on the market. I can only think of a few I like more for palm-gripping—namely, the enormous Mionix Naos 7000 ([go.pcworld.com/MionixNaos7000](http://go.pcworld.com/MionixNaos7000)).

(Claw-gripping's a different story. You can claw-grip the DeathAdder, but it's not easy. The rear of the mouse is tall enough that it's hard to get separation between your hand and the plastic.)

The DeathAdder is also notable because everything is oversized. Almost comically so. The scroll wheel? Huge and fat. The left and right mouse buttons? Wide and flared outward at the end, giving your fingertips even more space. The two thumb-buttons? Almost as big as your entire thumb.

It's not that the DeathAdder is a massive mouse. The form factor is pretty average, coming in smaller than the aforementioned Naos 7000, for instance. It's also very lightweight, feeling almost like a toy when you pick it up.

But where most mice—even most Razer mice—aim for subtlety, the DeathAdder makes everything as big and obvious as possible.

I think it looks a little silly, personally, but I can't deny it's



## Continued: **Gaming Mice roundup**

effective. You're never in the middle of a firefight frantically hunting for the thumb buttons because it's practically impossible to get your thumb away from them in the first place.

### **Light up the night**

There's also that fancy "Chroma" tag appended to the name now. That's Razer's RGB-enabled line, in case you're unaware—a.k.a. it lights up and looks pretty.

Razer's really gone the minimalist route with the DeathAdder Chroma's lighting, though. Both the Mamba and the Diamondback feature stunning lighting effects, with trails on each side that really make use of the RGB lighting.

The DeathAdder? Uh...the scroll wheel lights up and the logo lights up. Nothing else. No fancy light trails, no crazy rainbow strobe. If you set your new RGB mouse to green it would look pretty much identical to the previous DeathAdder model.

On the one hand, who cares? It's a mouse, and mouse lighting is purely decorative. But on the other hand, mouse lighting is purely decorative. I feel like if you're going to release an entirely new version of a long-standing product and market it on new lighting, that lighting better be damned spectacular. The DeathAdder is boring in comparison to Razer's other Chroma products.

But maybe that was to keep the price down. At \$70, the DeathAdder is the cheapest mouse in the Chroma line, and one of the cheapest in Razer's lineup period. Or maybe it's just an "If it ain't broke, don't fix it" mentality. After all, why tamper with a design if it's a proven seller?

### **Bottom line**

Anyway, it's the DeathAdder. It's pretty much the same as the previous version, except now the lights can

### **Razer DeathAdder**

#### **AT A GLANCE**

For 2015, the time-tested Razer DeathAdder design adds new lighting and an upgraded sensor.

#### **PROS**

- One of the most broadly appealing mice on the market
- Extremely comfortable

#### **CONS**

- Buttons can feel toy-like at times
- Left-handed version not updated to Chroma yet

\$70

★★★★★



change color and it has a 10,000 DPI sensor instead of the previous 6,400. It's still just as comfortable as ever, and as bare-bones as ever.

One final note: The Chroma version is only right-handed, at the moment. Razer still sells a separate left-handed DeathAdder, but it's on a par with the previous iteration. No fancy lighting for the left-handers yet. 🛑

## Logitech Daedalus Apex: Great buttons, weird shape

BY HAYDEN DINGMAN

### LOGITECH'S BEEN

**EXPERIMENTING** a lot lately, and sometimes it works out great! I keep referring back to the G502 Proteus Core in various reviews, and for good reason—I firmly believe it's one of the best mice on the market.

The G303 Daedalus Apex ([go.pcworld.com/LogitechG303](http://go.pcworld.com/LogitechG303))? Less successful.

### Two of a kind

Logitech first pitched me the G302 Daedalus Prime last year as a “MOBA-friendly mouse.” And then it came back mere months later with the G303 Daedalus Apex, which is pretty much the same design with slightly different internals. The biggest improvement is the Daedalus Apex has a 12,000 DPI sensor, as opposed to the Daedalus Prime's 4,000 DPI maximum.

For simplicity's sake, let's just look at the Daedalus Apex. It's better in pretty much every way than the Daedalus Prime, and the list price of \$50 is exactly the same for both.

So yeah: 12,000 DPI sensor (the same one that's in the G502), braided fabric cable sheathe, and six buttons—left, right, and middle mouse, plus one directly behind the scroll wheel, and two thumb



buttons on the side. Pretty standard stuff.

You can tell the G303 grew from MOBA roots by the feel of the left and right mouse buttons. Both feel extremely tight, with a minimum of travel. The resistance is maybe a touch too heavy for something built for rapid clicking, but it feels good. Extremely tactile and much more satisfying than, say, the DeathAdder's spongier buttons.

And that G502 sensor is a beauty. You can whip the Daedalus Apex around with perfect accuracy, no problem.

It's everything you'd want in a highly-responsive mouse except um...

## Diamond dog

What the hell is up with the shape of this thing? Keep in mind this is a mouse aimed specifically at claw and/or fingertip grippers, so palm grippers might as well stop reading. But even as a claw gripper myself, the Daedalus Apex is a bit awkward.

The Daedalus Apex is a small, thin diamond with a low front, high rear, and pointy sides. It looks almost like an ambidextrous mouse, but it's not quite symmetrical and Logitech neglected to put thumb buttons on the right edge.

OK, on the plus side: It's extremely lightweight. In fact, I'm pretty sure the braided cable weighs more than the mouse itself. The Daedalus Apex is pared down about as much as it could be while still being recognizably mouse-shaped, and the result is a smooth, easy glide. Again, made for MOBAs.

But my poor hand. No matter how I held the Daedalus Apex, it felt weird. Pure claw-grip, I had to bring my pinky to rest against the bottom edge of the mouse where it dragged along the mousepad. If I pushed my hand a bit to the side, one edge of the diamond running against my palm, it felt better—but then my thumb couldn't reach its dedicated buttons.

## Logitech Daedalus Apex

### AT A GLANCE

Logitech's recent experimental fervor reaches a new milestone with a...diamond-shaped mouse. It's weird.

### PROS

- Low-resistance left/right mouse buttons
- Sized for small hands

### CONS

- It's shaped like a diamond

\$50





## Continued: **Gaming Mice** roundup

Not that the thumb buttons are well-placed to begin with. They're arranged on the left corner of the Daedalus Apex's diamond, with one to the rear and one to the front of said corner. The rear side button is fine—your thumb presses against it like normal.


But the front side button? Pushing it involves pulling the thumb back in, toward the palm. It's not a very ergonomic motion, nor is it easy to execute without simultaneously shifting the mouse by a few millimeters.

Last but not least, we should complain a bit about the scroll wheel. It's coated in a slick rubber instead of the usual tire tread-esque grip, and it has a tendency to shift forward or backward whenever you try to click the middle mouse—the same problem I had with its sibling, the G502.

### **Bottom line**

I'm not a big fan. The G303 Daedalus Apex is outfitted like a premium mouse, with a dreamboat 12,000 DPI sensor and some of the nicest left/right mouse buttons I've had the pleasure of clicking. And Logitech's RGB lighting is, as per usual, beautifully handled—bright and accurate, with a pleasant honeycomb pattern.

That shape though. It's so awkward. I was excited to put the G303 through its paces because it's rare we get a mouse designed specifically for claw-grippers, but the Daedalus Apex feels like it needs (more than) a few revisions.

The one use case I can think of: People with smaller-than-average hands. Most gaming mice seem designed for giants. The G303 Daedalus Apex is one of the few that seems like it would work for those with daintier digits. 



# Mionix Castor: Another comfortable mouse from the cult favorite

BY HAYDEN DINGMAN



**MEET THE CASTOR:** A stripped-down, comfortable right-handed mouse with few buttons and even fewer frills. Or, as I like to call it, Mionix's DeathAdder.

It's not a one-to-one copy of the DeathAdder, as we often see from low-budget knock-offs. The Castor is decidedly its own mouse, with a unique ergonomic shape. You certainly wouldn't confuse the DeathAdder and Castor if you set them next to each other. But the similarities are apparent as soon as you lay hands on the Castor's silky-smooth frame.

## Clone wars

The Castor is a simple six-button mouse—left, right, and middle mouse, two thumb buttons, and then a DPI switcher to the rear of the scroll wheel. For the record, the Castor supports up to 10,000 DPI. I know you were wondering, since Mionix neglected to tack that stat onto the name this time.

The shape is right-hand-centric, and reads sort of like a cross between the DeathAdder and Mionix's own Naos 7000. In fact, the

## Continued: **Gaming Mice** roundup

Castor is a lot like the Naos 7000, but shrunk down. That makes it a bit more of a jack-of-all-trades mouse—a bit on the small side for palm gripping, a bit large for claw gripping, but the Castor accommodates both pretty easily.

It holds on to some of the Naos's best aspects, though, like grooves for your pinky and ring fingers. These aren't just comfortable but functional, giving you a bit of extra control when compared to the DeathAdder's smooth right slope.

And, to my relief, the grooves on the Castor are much less defined than on the Naos 7000. They feel more like a suggestion than anything else—available for palm grippers, but not a hindrance for claw grippers.



The Castor also features the same smooth, soft-touch coating I've come to expect from Mionix. Where the DeathAdder uses Razer's standard lightly textured plastic, the Castor feels much more luxurious. And again, it's comfort in support of function—the soft-touch texture also provides extra grip, though the trade-off is (in my experience) a bit more heat/hand sweat.

It's just a Very Nice Mouse, with the aforementioned niceties and then all the standard tricks—a braided fabric cable, lighting in the scroll wheel and logo, and some textured rubber under the thumb.

In reviewing the DeathAdder (again) this year, I noted that it's pretty much the standard by which all other gaming mice are judged, if only because it's so damned pervasive. The Castor? It's the DeathAdder: Director's Cut—the same design philosophy, with a couple of perks.

As such, I'd say the Castor is probably the best "universal" gaming mouse you could find, at the moment. It is understated enough to work in pretty much any game, with pretty much any grip you can imagine, and will still be comfortable.

Does it excel in any one area? No, but it doesn't need to. Where another mouse might focus in on a certain aspect and make sure that one aspect is great, the Castor simply makes sure all aspects are pretty damn good.

## Pricing


The one issue? Price.

The DeathAdder and Castor actually list for the same price of \$70, so that's not the issue. The problem is you can typically find the DeathAdder on perpetual sale for \$60 or less, while the Castor has no such discount (at least on Amazon) day-to-day.

Do I think the Castor is worth the extra \$10? Absolutely. I like the shape more, I like the finger grooves, I like the DPI switch. But that's ultimately a personal judgment call.

## Bottom line

Mionix is a cult favorite for a reason. For a company with so little mainstream recognition, Mionix is putting out some of the best modern gaming mice—over and over and over again. And now it has created one that could actually go mainstream, considering it's their most broad-appeal mouse yet.

I like the Castor a lot. It's simple, it's versatile, and it's just luxurious enough to give it an edge over Razer's similarly equipped DeathAdder. It might not be the best mouse, but it's a good starting point if you're in the market and need something that does it all. 

## Mionix Castor

### AT A GLANCE

Mionix's latest mouse melds its eye for ergonomics with the broad-appeal accessibility of the Razer DeathAdder.

### PROS

- Trademark Mionix ergonomics
- Much smaller than last year's NAOS 7000

### CONS

- Doesn't go on sale often
- Doesn't excel in any one area

\$70



## SteelSeries Rival: Name-brand performance on a budget

BY HAYDEN DINGMAN



**PC GAMING DOESN'T** need to be expensive. Sure, you could throw down \$70 on a Mionix Castor or \$80 on Logitech's G502 or a whopping \$90 on the Razer Diamondback. But you don't need to.

One thing I like about SteelSeries (and Logitech too) is that they have a habit of shoring up their peripherals lineup with some lower-cost alternatives. Damn good alternatives, for that matter—just missing some of the bells and whistles.

Alternatives like the \$40 Rival 100.

### Entry-level

Despite sharing a name with the Rival 300, the two aren't really that much alike. This isn't just "The standard Rival with a slightly worse sensor." It is, as far as I can tell, a different product—slightly different shape, different thumb buttons, different feel.

I joke about the DeathAdder being a stripped-down gaming mouse, but the Rival 100 really is bare bones. It's a six-button mouse—left, right, and middle, plus a DPI switch and two thumb buttons on the left edge.

SteelSeries claims this is a right-handed mouse, but it's really subtle. In fact, only the missing thumb buttons on the right edge clued me in, initially. It feels, for all intents and purposes, like an ambidextrous mouse. The right edge is already cut flat and textured, like an ambidextrous mouse, and I'm baffled the company didn't simply go all the way on that aspect. Even the Rival 300 has more of a "right-hand shape" than this.

But whatever. Point is, it's geared toward right-handers, but, given its almost-ambidextrous shape, accommodates all grip-types with a minimum of hassle. Palm-gripping and claw-gripping are equally welcome here, though I'd say claw gripping is a bit more comfortable due to the narrow width. Palm gripping gave me hand cramps after a bit of use.

It's a solid entry-level mouse, with a 4,000 DPI optical sensor and the usual SteelSeries soft-touch texture. And it even has SteelSeries's usual RGB lighting on the scroll wheel and logo—surprising, for a product at this price tier.



## Pressing my buttons

My biggest complaint with the Rival 100 is the thumb buttons. The Rival 300 has very nice, oversized (almost DeathAdder-esque) thumb buttons, with great ergonomics and a satisfying tactile feel.

The Rival 100 has two thin, cheap-feeling thumb buttons that are obnoxiously loud and clicky. This is the only mouse I've ever used where clicking the thumb buttons is louder than the main left and right click functions.

To make matters worse, they're pointy. Instead of meeting in the middle, there's a small gap between the two thumb buttons. The edges of the buttons in this gap form a small pyramid-point that jabs

## Continued: **Gaming Mice** roundup

into the pad of your thumb. Adjusting your thumb back-and-forth across the two buttons ranges from unpleasant to downright uncomfortable.

It's a shame, because it's the one feature that I think undercuts what's otherwise a solid gaming mouse at an amazing price point. But these thumb buttons should never have made it past testing—the edges should've been rounded more, or brought closer together.

### **Bottom line**

The Rival 100 is a solid choice for people on a budget, but honestly the jump from low-tier to mid-tier to high-tier is a lot smaller in mice than in other peripherals. Most of the time you can find the Razer DeathAdder on sale for only ten to fifteen dollars more, and it's a huge improvement. Or the Rival 300, which lists for \$60 but can typically be found for less—and is, again, an improvement on the Rival 100.

But if you absolutely can't stretch the budget further, the Rival 100 is a pretty good option. It gives you the bare necessities for a gaming mouse (an accurate sensor, moderately high DPI range) without compromising too much on comfort and style.

Just take a bit of sandpaper to those thumb buttons. 🛠️



### **SteelSeries Rival 100**

#### **AT A GLANCE**

The SteelSeries Rival 100 is a solid option for budget-minded gamers, but some odd design flaws hold it back.

#### **PROS**

- Name-brand quality on the cheap
- Decent sensor

#### **CONS**

- Thumb buttons are oddly pointy
- A bit more money would get you a much better mouse
- Almost-ambidextrous shape, but without the ambidextrous perks

\$40





# Enhance GX-M2 and -M3: \$15 can get you a decent amount of gaming mouse

BY HAYDEN DINGMAN

**THE \$40 STEELSERIES** Rival 100 still too rich for your blood? How about spending...\$15?

Earlier this year I had a few “Enhance” mice sent over to me by [AccessoryPower.com](#). I’d never heard of them before, but we don’t really do a ton of budget gaming mouse reviews around here so I thought I’d check them out.

And you know what? You can get a pretty decent gaming mouse for cheap. Like, real cheap.

## The GX-M2

Let’s start with the Enhance GX-M2. This is ostensibly a right-handed mouse, though the shape is (like the Rival 100) about as ambidextrous as could be without sticking two thumb buttons on the right side.

It’s surprisingly comfortable, with the soft-touch coating I typically associate with much more costly devices (like the Mionix) and an oversized form factor. I don’t have enormous hands, but the GX-M2’s size fits me a lot better than, say, the diminutive Logitech G303. The rear is raised a bit high, forcing a slightly uncomfortable kink in my wrist even when palm-gripping, but it’s otherwise pleasant to use.



Enhance GX-M3

## Continued: **Gaming Mice roundup**

### **GX-M2**

There are eight buttons: left, right, and middle click, two thumb buttons on the left side, two DPI switches behind the scroll wheel, and a profile switcher behind that. The left and right mouse buttons take cues from Razer's DeathAdder, with a lengthy (comfortable) finger groove and flared ends. It feels pretty nice, though the switches are a bit flimsy.

The M2 defaults to a 500Hz polling rate but you can bump it to the gaming-standard 1,000Hz in software. The DPI buttons are more static, stepping up and down between the three presets: 800, 1600, and 3200 DPI. That's low for a gaming mouse nowadays, but honestly it's the obscenely high lift-off distance I had the most trouble with. I needed to pick the mouse up almost a centimeter to get it to stop registering movement.

It's a pretty standard gaming mouse, albeit with limited sensor capabilities. There's even accompanying software, allowing you to reprogram buttons or set up profiles. All in all it's a pretty solid product for \$15.

My only major complaint with the M2 is the design. Not the form factor, but the awful blue and black leopard print (Giraffe print? Snake print?) on the top. If this mouse were flat black or even black and gray, I think it'd look a lot less cheap. The print looks like something I would've seen at Best Buy a decade ago.

**Enhance GX-M2**



### **The GX-M3**

Moving on to the GX-M3, a.k.a. "I'm pretty sure I'm holding Optimus Prime's head." Credit where it's due, the GX-M3 looks decidedly more high-end than the blue animal print of the M2. But—and this is surprising—it's actually not an upgrade aside from the aesthetics.

The M2 looks cheap, but with a 3,200 DPI sensor and 1,000Hz polling rate it's actually not a bad deal for \$15. The M3 is more the performance I'd expect in a budget mouse, limited to a 2,800 DPI sensor and a 500Hz polling rate. That's still not terrible, especially for the price, but it means the M3 isn't a straight upgrade over the M2.

It does have a few benefits, though.

The M3 is a seven-button mouse: Left, Right, and Middle click, two thumb buttons, and then the DPI up/down buttons on the top. The buttons are very loud and clicky, even in comparison to the M2, but they do have a more satisfying tactile feel.

There are also five removable weights in the M3's base. It ships at its heaviest, which I actually prefer, but you can pull all the weights out for a featherlight M3 if you want.

The design itself is very experimental, reminiscent of Logitech's G502 or the Mad Catz R.A.T., not so much in terms of form factor but in terms of the



**Enhance GX-M2**

## **AccessoryPower Enhance GX-M2**

### **AT A GLANCE**

Sure, the GX-M2 lacks many of the frills of the higher-end competition. But for \$15? Not too bad.

### **PROS**

- Extremely cheap
- Surprisingly comfortable

### **CONS**

- Limited sensor capabilities
- Tacky-looking blue/black snakeskin design

\$15



## Continued: **Gaming Mice roundup**

weird industrial lines and cutouts that deck the outside.


Those lines and cutouts showcase the M3's hallmark feature though: DPI-specific lighting. Swapping between the four presets (800, 1200, 2000, 2800) causes the LED lighting to change from blue to green to pink to red. It's actually a very pretty effect, though I'm not sure it's enough to sell you on the M3.

It also feels pretty strange under the palm, with weird ridges and pointy edges that aren't entirely pleasant. I definitely don't love the feel as much as that of the M2, though I once again appreciate the oversized length. Whoever is on the design team for these Enhance devices must have big hands.

As I said, it's not a straight upgrade over the M2 though. And that's a shame because I think the M3 is, by anyone's standards, a much nicer looking device. I wish the company could combine the performance and feel of the M2 with the higher-end look of the M3. Then it would have a true winner.

### **Bottom line**

For fifteen dollars, though? The GX-M2 and -M3 are not too bad. My only real concern is the long-term quality. I noticed the pads on the bottom of the M2 were a bit loose and/or starting to peel off, straight out the box. I'm not sure this is a mouse you're going to use for the long haul.

But if you're trying to build a gaming PC on a budget, I think you could get by with one of these until you saved up for your dream mouse. It's certainly better than the generic Logitech mouse/keyboard set I used when I was poor and built my first gaming PC. 

### **AccessoryPower Enhance GX-M3**

#### **AT A GLANCE**

The GX-M3 looks better than its blue/black snakeskin-clad GX-M2 sibling, but better aesthetics come at the cost of performance.

#### **PROS**

- Better aesthetic than the GX-M2
- Satisfying weight

#### **CONS**

- Even more limited sensor than the GX-M2
- Uncomfortable shape

\$15



# G.Skill MX780: G.Skill's debut mouse is a great start

BY HAYDEN DINGMAN

**IF I LEARNED** anything from Logitech's G502, it's "Don't judge a book by its cover." Or, in this case, "Don't judge a mouse by how damn weird it looks." Oh, hey there, G.Skill.

G.Skill just released its debut mouse a few months ago, the Ripjaws MX780. And if you can get past the oh-so-edgy name and design, there's quite a bit to appreciate here.



## Get your back up

Let's get the basics out of the way. The MX780 is an eight-button ambidextrous mouse: The standard left, middle, and right click, a DPI switch behind the scroll wheel, two thumb buttons on the left, and two thumb buttons on the right.

We can run down the standard checklist here: 1,000Hz polling rate, braided fabric cable sheath, 512KB onboard memory for profile storage, and an 8,200 DPI sensor—which doesn't quite match the lofty (ridiculous) numbers being thrown around by some of its competitors, but for most people it'll be plenty.

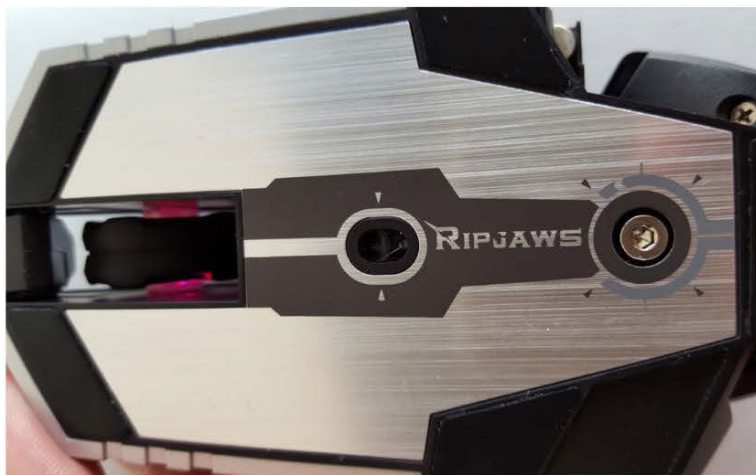
The build quality also deserves a call-out—much of the MX780 is built from aluminum, and it's both durable and gorgeous to look at. Given that most of the mice I use are entirely shrouded in plastic and

## Continued: **Gaming Mice roundup**

rubber, the MX780 feels like a huge step up in terms of quality. It screams “Premium Mouse” even though it’s not more expensive than the competition.

And the four-zone RGB lighting is as well-implemented as anything by Razer or Logitech. Just make sure you download G.Skill’s software and change the color, because the default is a ghastly salmon color.

Let’s get into the cool stuff, though—namely, the fact the MX780 is pretty much “G.Skill’s less black-and-green version of the Razer



**The brushed-metal bottom.**



**Mouse customization channels** are held in place with magnets.

Ouroboros.” Or, if you prefer, it’s an ambidextrous version of Logitech’s G502 Proteus Core. Which is about the highest compliment I could give.

Listen, I love customization. I don’t think it’s essential every mouse manufacturer start enabling all sorts of tweaking and tinkering, but I appreciate it when they do. Why? Because it’s unlikely you’ll ever find a mouse you think is perfect straight out of the box. The more options you give me, the more likely it is I can make your mouse work.

The MX780 gives you quite a few options. As I mentioned, this is an ambidextrous mouse, so there are thumb channels along both sides. These channels are held on with magnets, and can be swapped out for more/less textured versions with wider/narrower footprints.

Remove the trays and you can also slot 4.5 gram weights into each side—a nice touch, though it tends to make the mouse a bit heavy in the back (or to one side) instead of the G502’s more equal distribution of weight. And even with both weights inserted, the mouse wasn’t as heavy as I’d like.

Flip the mouse over and you’ll find a hex key you can turn to adjust the height of the palm rest. Used to palm-gripping? You’ll probably want to push it a bit higher. Claw gripper? Keep it low so you don’t have to bend your fingers quite as much.

The MX780 doesn’t quite match the versatility or comfort of the G502, but it’s damned close—especially for an ambidextrous mouse. And I think I like the feel of it just a bit more than the Ouroboros.

## Pinky goes where?

It’s not perfect, though. I’ve got a few significant complaints with the MX780 that I hope are rectified in G.Skill’s next outing.

1. The buttons are loud. The left and right buttons

## G.Skill Ripjaws MX780

### AT A GLANCE

For an ambidextrous mouse, the MX780 is probably one of the best price-to-performance bargains.

### PROS

- Allows for plenty of customization
- Durable, machined aluminum construction
- Fairly inexpensive

### CONS

- “Edgy” name and design
- Flimsy thumb buttons

\$60





## Continued: **Gaming Mice** roundup




are fine, and have a satisfying springiness to them. But the thumb buttons are obnoxious, with an atypically noisy click that still annoys me even after hours of use.

**2.** The thumb buttons are also flimsy-feeling. Considering I talked up the superior build quality of the MX780, with its machined aluminum, it seems strange that the four thumb switches are so fragile. But they are, with a worrying amount of wiggle and an unpleasant sponginess.

**3.** And, just to continue on the theme, the “thumb” buttons are poorly placed—meaning whichever pair is not actually under your thumb. They sit too far back for my ring finger but too far forward for my pinky, meaning the second pair is borderline useless. I find myself triggering them accidentally far more often than on purpose.

**4.** G.Skill’s software is bunk. I’m not too surprised, given they’re pretty new when it comes to peripherals. Most other companies have had a few years to get their software in order, while G.Skill is starting from scratch.

But the fact remains that it’s overly cumbersome to customize the mouse and the lighting isn’t especially accurate—a common issue with RGB products, but it’s especially noticeable here. 

# Roccat Tyon: Winner of “Most Buttons, 2015 Edition”

BY HAYDEN DINGMAN



**THE ROCCAT TYON** feels like a relic from another age—one where mouse manufacturers frantically tried to cover every surface with buttons in some sort of mad arms race (or fingers race, if you will). Why settle for one button for your index finger when you can have three buttons? And three for the ring finger. While we’re at it, why not build the thumb its own telegraph switchboard?

## Cheaper by the dozen

The main draw of the Roccat Tyon is the buttons. Sure, it has an 8,200 DPI laser sensor, the standard 1,000Hz polling rate, and a nifty RGB light channel around the bottom of the mouse.

*But the buttons.*

The Tyon has (to my count) twelve buttons and an analog paddle that wobbles up and down. What’s more, one of those buttons functions as a modifier key (which Roccat brands “Easy-Shift Technology”), effectively giving you double the button mapping.

## Continued: **Gaming Mice** roundup

There's left, right, and middle click, plus two additional buttons mapped to both the ring and index fingers. Behind the scroll wheel is a paddle that clicks back and forth (digitally). The thumb does most of the heavy lifting, with two thumb buttons and the modifier button and the aforementioned analog paddle.

It's a beast of a mouse, and yet surprisingly comfortable—as long as you have moderately large hands and use the “correct” grip. As far as I can tell, the Tyon caters to a three-finger palm grip. In other words, your index, middle, and ring fingers are all located on top of the mouse.

You can get away with other grips, with varying results. Keeping only two fingers on top of the mouse (with middle finger controlling both the right click and the scroll wheel) means your ring finger is in the way of two buttons and your pinky is squeezed for space. Claw grip means you lose access to the paddle behind the scroll wheel, though it's easier to hit the two extra buttons on the index/ring finger.

The main question is, as always, whether you

actually need this many buttons. Unless you're playing an MMO or something like Arma III, it's doubtful. The button-heavy mouse has fallen out of fashion in most circles for good reason—for most people, six or eight buttons is the sweet spot. Add more and you're likely to forget to take advantage.

And the Tyon makes some weird choices. That modifier (Easy-Shift) key, for instance. There's a button on the thumb rest that is basically an Alt key for your mouse, giving you twice the mapping options. Great, in theory.

But due to the button's placement, it's pretty much impossible to hold it down and use the other two thumb buttons at the same time. Plus, notice I said it's located on the thumb rest? Roccat put the



modifier button right where you'd typically lay your thumb, which led to a few inadvertent clicks on my part.

I also wish the top (digital) paddle and scroll wheel were simply combined into a tilt wheel. The tilt wheel is one of my favorite (rare) mouse features, and even made its way to Razer's 2014 Naga. The Tyon has all the components of a tilt wheel...split into two pieces. It seems unnecessary, and the placement of the paddle is awkward as hell at the moment.

I like the Tyon better overall than the Naga, though. I've always had trouble telling the difference between the Naga's twelve numpad-style thumb buttons. The Tyon gives you similar functionality but with more unique button positions.

And really your appreciation for the Tyon will come down to how much time you're willing to put into fiddling. This isn't a plug-and-play sort of mouse. Or, at least, not if you want to tap into its full potential. You're going to need to spend some time deciding how to map each button twice-over.

Do so, and some ingenious control schemes open up though. Change weapons by flicking the analog paddle back and forth. Melee by hitting the left mouse while the modifier key is held down. The Tyon has a ton of functionality, if you've got the patience and the creativity.

## Bottom line

I'm personally pretty happy with a more stripped-down mouse. I don't play many games that would take advantage of the Tyon's suite of buttons, and even when I do I'm typically prone to forgetting what mouse shortcuts I've set up.

If you are in the market for a button-heavy mouse,

## Roccat Tyon

### AT A GLANCE

The Roccat Tyon wins *PCWorld's* 2015 Award for Most Buttons, but a few aspects could use some fine-tuning.

### PROS

- So many buttons
- Easy-Shift modifier key is sorely missed when returning to competing devices

### CONS


- Some awkward button placements
- Takes forever to set up, if you want to tap its full potential

\$100



## Continued: **Gaming Mice** roundup

the Tyon is probably my favorite though. It's much more intuitive to me than the Naga-style numpad design, and I actually found myself missing the Easy-Shift function once I went back to a different mouse.

The only real issue is the price. \$100 is steep, for any mouse—even if you do the math and realize the Tyon's cost breaks down to \$7 per button. 



# Razer Mamba: Wired, wireless, or somewhere in-between

BY HAYDEN DINGMAN



**RAZER ACTUALLY RELEASED** two Mamba models this year—the luxury model (named, simply, the Razer Mamba) and its sibling, the Mamba Tournament Edition (or Mamba TE for short).

They're pretty much identical except the high-end Mamba is optionally wireless, has a built-in battery, and has "adjustable click force technology." Oh, and the Mamba TE costs half as much.

## The Razer Mamba

Let's take a look at the luxury Mamba first, because damn. Razer didn't build a mouse. It built an art exhibit.

The Mamba is a wireless, 16,000 DPI mouse with a 1 millisecond polling rate and some nifty LED tracks down the sides. Plus a majestic, LED-equipped stand for recharging. It looks lovely, with an elegant aesthetic that matches its absurd \$150 price.

But does it perform like a \$150 mouse? Well...

The Mamba is honestly pretty similar to the Razer DeathAdder in design. Both are supremely comfortable and tailored to a right-hand palm grip, though with oversized buttons that enable claw gripping.

## Continued: **Gaming Mice** roundup

The Mamba's latest iteration makes the two even more similar by eliminating the two extra index-finger buttons that used to sit next to the left mouse. Instead it adds (my favorite feature) a tilt-wheel, giving you standard left, right, and middle click, plus two thumb buttons and clicking the scroll wheel left and right.

Personally I find the Mamba just a bit more comfortable than the DeathAdder, thanks to a gentler (more convex) slope on the right side. There's more room for my pinky. But you'd be hard-pressed to feel the difference without having both side by side.

There are some under-the-hood improvements on the DeathAdder, though. First up is the sensor. In terms of raw numbers, the 16,000 DPI Mamba beats out the DeathAdder's 12,000 DPI sensor. Of course, both are ludicrously high for day-to-day use so it's doubtful you'd need to max out either. But the option is there, I guess!

And then there's the "adjustable click force technology." Flip the Mamba over and you'll spot two hex-wrench screws embedded in the bottom. You can adjust the resistance of the left and right mouse buttons independently from 45 to 95 grams of resistance.

**This looks ridiculous** but I kind of love it for its audacity.







Can you feel the difference? Yes. There's a more distinct thunk at 95g, for sure. But will it change the way you play? Probably not. Razer recommends 45g for MOBAs and other rapid-click games, but I got 68 clicks in ten seconds at both 45g and 95g—though the latter did, admittedly, make my wrist a bit more tired.

The point is: Both feel fine, and it's not nearly as noticeable a change as, for instance, adding weights or adjusting the height of the palm rest.

Finally, the wireless. Here's where I really find fault with the Mamba.

I typically don't use wireless peripherals, in large part because I want everything I own to just work, all the time. The Mamba, although pretty damn good as far as wireless devices go, still had a few moments during testing where it lost tracking and needed to re-pair. And the Mamba's internal battery, though excessively heavy, lasts a scant 20 hours even by Razer's (under perfect conditions) reckoning. That's...not great. Sooner or later you're liable to run out of power at an inconvenient time.

## Razer Mamba

### AT A GLANCE

The wireless Razer Mamba brings some gorgeous hardware and neat gimmicks, but fails to justify its \$150 price tag.

### PROS

- Elegant appearance
- One of the few wireless gaming mouses

### CONS

- Ridiculously expensive
- Charge lasts about a day, maximum
- Weighted strangely

\$150



## Continued: **Gaming Mice roundup**

If that happens, you can connect the Mamba directly to your computer with a MicroUSB cable—but at that point why not spend half as much and get the always-wired Mamba Tournament Edition?

### **The Mamba Tournament Edition**


Which brings us to the Mamba's less-expensive sibling. The Mamba Tournament Edition is the same exact mouse—same 16,000 DPI sensor, same lighting effects, same 1 millisecond polling rate—except it's always wired. Oh, and it's missing the feels-sort-of-gimmicky “adjustable click force technology.”

And it costs \$90 instead of \$150.

I also like the weight of the Mamba TE more. Because it's a wired mouse, there's no bulky battery weighing down the Mamba TE—and it makes a huge difference. I actually prefer a heavy mouse, with my love for Logitech's G502 as a testament to that. But the G502 is well-balanced, where the wireless Mamba is back-heavy.

### **Bottom line**

I can't imagine why you'd buy the regular Mamba instead of the Mamba TE, unless you're dead set on going wireless. Razer's made a beautiful mouse, but \$90 is already pushing what I'd pay. And \$150 is too rich for me, even if the Mamba and its charging stand are two of the prettiest devices I've ever had on my desk.

The Tournament Edition has 90 percent of the functionality without necessitating you mortgage your home or put your mouse on a charger every night. That gives it the edge, in my book. 

### **Razer Mamba Tournament Edition**

#### **AT A GLANCE**

At \$90, the Razer Mamba Tournament Edition is still a bit more expensive than its fuller-featured competition, but it's a decent way to get your hands on the high-end Mamba's 16,000 DPI sensor for half the cost.

#### **PROS**

- Same high-end sensor and design as the more-expensive Mamba
- No concerns about battery running out mid-game

#### **CONS**

- Still fairly expensive for such a basic mouse
- Loses the adjustable click gimmick of the high-end Mamba

\$90





# 14 of the most-promising new headphones we checked out at CES 2016

BY SARAH JACOBSSON PUREWAL

**2016 WILL BE A BANNER YEAR** for new headphones. This year's CES saw headphone manufacturers moving in several directions. Almost every lifestyle brand has gone wireless for convenience' sake, but top-of-the-line offerings remain wired so as not to compromise audio quality. Thanks to rumors that Apple is doing away with the 3.5mm audio port on its next phone, several companies are looking to find digital solutions that plug directly into an iPhone's Lightning port (or the microUSB port on every other manufacturer's smartphone).

**Bottom line:** There's something for everyone. If you're looking for your next wear-em-'til-they-fall-apart go-to headphones, here are 14 pair we think you'll want to know more about.

## Sennheiser HD 800 S

Sennheiser's HD 800 S circumaural headphones have some of the largest ear cups I've ever encountered, but I suppose that's necessary to fit the ginormous 56mm drivers, which offer up incredibly detailed, wide-range sound. You don't have to be an audiophile to hear the difference in these headphones; the HD 800 S have been fine-tuned from their predecessors, the HD 800, to allow for slightly more forgiving, but still entirely natural, audio.

Fabricated from layers of plastic and stainless steel and featuring a silk-gloss matte finish, the HD 800 S are not quite as plush as some of their competitors, but I'm a fan of the machined look, and the ear cups are huge but comfortable. The Sennheiser HD 800 S ([go.pcworld.com/SennheiserHD800S](http://go.pcworld.com/SennheiserHD800S)) will be available soon for \$1,700.





## Audeze Sine

Want to know what a pair of \$1,000+ headphones sound like for half the price? From your smartphone? You're in luck: Audeze, everyone's favorite planar headphone maker, showed off its new ultra-portable (relatively speaking) on-ear Sine headphones (\$500), which ship soon. These closed-back headphones have an 80mm by 70mm planar magnetic driver and pump out very neutral, true-to-life sound. I felt as though I was sitting in the front row of a private concert during my demo.

The Sines come with a standard 3.5mm audio cable and a 2.5mm stereo cable, but they also work with Audeze's ([go.pcworld.com/AudezeSine](http://go.pcworld.com/AudezeSine)) Cypher Lightning cable, which plugs directly into your iPhone's or iPod touch's Lightning port. This allows the headphones to bypass Apple's digital-to-analog converter in favor of the higher-performing inline DAC that's part of the cable.

## **JBL Everest 700 Elite**

Noise-canceling headphones are tricky, because it's not practical to completely isolate ourselves from ambient noise in many everyday situations. JBL's Everest 700 Elite over-ear headphones have a solution: NXTGen Active Noise Cancellation technology, which lets you choose your level of ambient noise influx. Using JBL's My JBL Headphones app, you can set your outside awareness to high (lots of ambient noise), medium, or low (where you're isolated from outside noises). You can also set each ear cup individually.

The headphones also have a button that lets you toggle between ambient noise levels, but you won't be able to set individual cups from here. The Everest 700 Elites are packed with features, including a foldable design, ultra-plush noise-isolating leather ear pads, and 15-hour battery life. These headphones are available now for \$300.



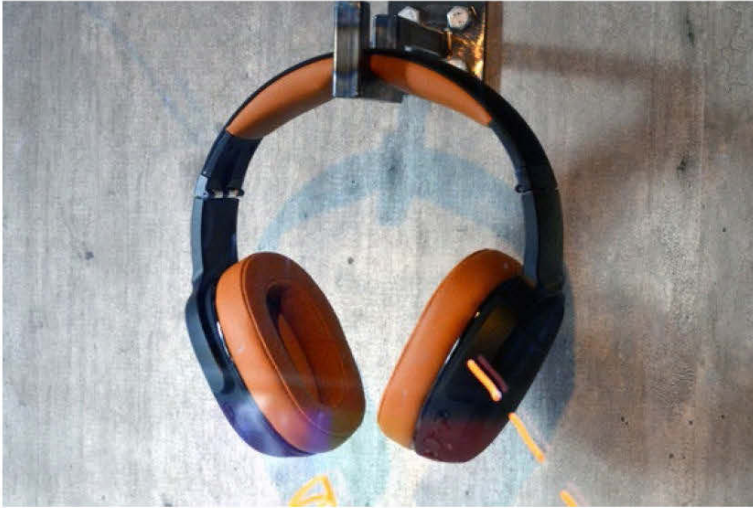
## **Beyerdynamic T 5 p (second generation)**

Beyerdynamic's T 5 p circumaural headphones are designed to give you audiophile sound from a mobile device. These luxury headphones have soft, leather-covered, memory-foam ear pads; a lightly padded leather headband; and a dual-sided cloth-covered cable. They're large and a little heavy, but they do an excellent job of passively isolating noise (honestly, better than many active noise-canceling headphones I've tried).

The T 5 p's feature Beyerdynamic's ([go.pcworld.com/T5p](http://go.pcworld.com/T5p)) signature Tesla (after the scientist, not the car) technology, which allows for an impressively wide soundstage despite relatively small (32mm) drivers. These headphones definitely do not disappoint—and for \$1,099—they shouldn't.







## Skullcandy Crusher VRA

Virtual reality is big this year, even in audio. Skullcandy's ([go.pcworld.com/SkullcandyCrusher](http://go.pcworld.com/SkullcandyCrusher)) latest premium addition to its Crusher line is the Crusher VRA, a wireless Bluetooth headphone with 40mm mid-range drivers and proprietary directional bass drivers in each ear cup. The idea here is that you'll be able to feel the bass, sort of like what we saw in Alpine's headphones ([go.pcworld.com/AlpineHeadphones](http://go.pcworld.com/AlpineHeadphones)), except the bass response will be located in the ear cups instead of in the headband.

Putting you-can-feel-the-bass drivers in the ear cups means that the Crusher VRAs will let you hear and feel directional sound if you happen to be, say, watching a movie. After all, there's nothing quite like literally feeling the lumbering steps of the T-Rex in Jurassic Park creeping up on you. The Crusher VRAs will launch this fall and retail for \$300.

## Bose SoundLink around-ear wireless headphones II

Bose's SoundLink around-ear wireless headphones II are mostly plastic, minus soft leather ear cups and a padded suede headband. But plastic isn't necessarily a bad thing, as these circumaural headphones weigh a measly 5.27 ounces; they're so light you'll barely register putting them on. They also boast several useful features, including the ability to simultaneously connect to two devices at once via Bluetooth.

The right ear cup houses all the controls: a power/pairing mode switch, physical volume up/down buttons, and a play/pause button. An NFC chip lets you easily pair your active device with just a tap. There's no active noise cancellation, but you will get 15 hours of playback time and a 15-minute quick-charge will tack on an extra two hours. The SoundLink around-ear wireless headphones II ([go.pcworld.com/BoseSoundLink](https://go.pcworld.com/BoseSoundLink)) are available now for \$280.



## Monster 24K Bluetooth Over-Ear Headphones

These shiny rose-gold headphones (note: they're not made of real gold) are more than just a pretty face. Monster's 24K Bluetooth Over-Ear ([go.pcworld.com/Monster24K](http://go.pcworld.com/Monster24K)) headphones are chock-full of high-end features, including 24-hour battery life and the ability to plug directly into your smartphone's microUSB port for true digital audio (via a special cable that will be sold separately).

These wireless headphones have Bluetooth 4.0 with aptX support to stream high-definition sound from your audio device. They also have touch controls located just above the ear cups (not on the ear cups, which can be inconvenient) and a built-in microphone with noise cancellation that lets you hear your own voice while you're speaking. The headphones themselves do not feature active noise cancellation, though the memory foam ear cups do a good job of keeping unwanted noise out. The 24K Bluetooth Over-Ear headphones will be available in the second quarter of this year and will retail for \$320.





## Phaz P5 Bluetooth Digital Headphones

Phaz is still touting its patented “charge while you listen” technology, but its newest P5 headphones offer more than just a full smartphone battery. Phaz ([phazmusic.com](http://phazmusic.com)) says its new P5s are the world’s first “universal” digital headphones, which means they connect to your smartphone via microUSB or through Apple’s Lightning port; other digital headphones, such as the Monster 24K Bluetooth Over-Ear headphones, are compatible only with either microUSB or Lightning ports.

Connecting directly into the microUSB/Lightning port of your smartphone lets the P5s bypass your smartphone’s onboard DAC and amplifier, allowing for better audio quality than you would get if you plugged directly into the 3.5mm port. The P5s also have Bluetooth 4.0 with aptX support and will cost \$450 when they drop in August of this year.



## House of Marley Rise

Not all headphones need to be overly indulgent, with premium touches like leather and polished aluminum. House of Marley's ([thehouseofmarley.com](http://thehouseofmarley.com)) Rise headphones are simple, wired mid-range headphones made of stainless steel and HoM's signature Rewind fabric, which is made of recycled plastic bottles, hemp, and cotton.

The Rise feature an on-ear design with comfy fabric-covered ear pads and a lightweight metal frame that's easily folded and stashed away. These headphones aren't expensive—they'll cost just \$100 when they start shipping in the second quarter of this year—but they do pack 50mm drivers and offer up a nice, balanced sound profile.

## MrSpeakers Ether C

MrSpeakers' Ether C over-ear headphones are sumptuously large, with 2.75-inch by 1.75-inch single-ended planar magnetic drivers. The drivers feature MrSpeakers' patent-pending V-Planar surface processing, which allows for a better high-end frequency response and significantly lower distortion.

These closed-back headphones—MrSpeakers ([go.pcworld.com/mrspeakers](http://go.pcworld.com/mrspeakers)) also has an open-back version, simply called the Ether—have noise-isolating lambskin ear pads, which do a good job of keeping ambient noise out—though they weren't able to block out the sound of 300 Wyclef Jean fans screaming at the Creative Audio booth. The Ether Cs are made of premium materials, including carbon fiber, micro-suede, and precision-machined aluminum. They look and feel pricey and are available now at prices that start at \$1,500 with a basic 3.5mm audio cable.



## Massive Audio Flex

Massive Audio's wireless Bluetooth circumaural headphones might seem an odd choice for this roundup; after all, these glossy plastic \$120 cans aren't exactly in the same league as Sennheiser's HD 800 S. But hear me out: The Flex headphones, which feature 54mm drivers and an impressive 35 hours of battery life are actually pretty good for their price point.

They might not be for audiophiles seeking ultra-natural sound, but anyone who appreciates Beats' over-the-top bass will enjoy the Flex's 'Super Bass' button. In my brief booth test of the Flex ([go.pcworld.com/maflex](http://go.pcworld.com/maflex)), the Super Bass did significantly pump up the bass line (though, at medium-high volume levels, with quite a bit of distortion and fuzzy confusion). These headphones aren't for everyone, but they can hold their own with the bass-heavy popular crowd (they're also available now).





## Plantronics BackBeat Sense

Plantronics' BackBeat Sense ([go.pcworld.com/backbeatsense](http://go.pcworld.com/backbeatsense)) on-ear headphones give you all the coveted features of the BackBeat Pro, including headband sensors that can tell when the headphones are on your head; extra-long battery life (though the Sense only offers 18 hours to the Pro's 24-plus); and extra-long Bluetooth range if you have the right device, all without the heft or the price.

The Sense, available now, cost \$180 and are much, much smaller and lighter than the Pro. These headphones are comfortable enough for all-day wear, and the soft on-ear ear pads do a decent job of blocking out ambient noise (there's no active noise cancellation). The Sense can connect to two devices simultaneously, and can also be located (if they're within Bluetooth range) from your phone via Plantronics' app.



## B&O Play H7

I won't lie: The other Bluetooth wireless headphones in this roundup are comfortable enough, but they all look rather utilitarian. B&O Play's H7 ([go.pcworld.com/beoplayh7](http://go.pcworld.com/beoplayh7)) headphones are sexy (and comfortable, and functional, naturally). These pretty headphones feature lambskin-covered memory-foam ear cups, a leather-covered padded headband, and a machined aluminum frame. The H7s are fairly lightweight at 8.1 ounces, and while they don't have active noise cancellation, the plush ear cups do an excellent job of keeping ambient noise at bay.

The H7s feature touch controls on one ear cup and a built-in microphone for taking calls. But these sleek, stylish headphones don't come cheap: They're currently available for the retail price of \$449, almost as much as those drool-worthy Audeze Sines.





## Audio-Technica SonicPro ATH-MSR7NC

The unfortunate truth about headphones with active noise cancellation is that audio quality is often compromised. Active noise cancellation, after all, produces noise to mask noise. That's why so many higher-end models tend to feature only passive noise isolation, which focuses on sealing your ears so ambient sound can't reach them.

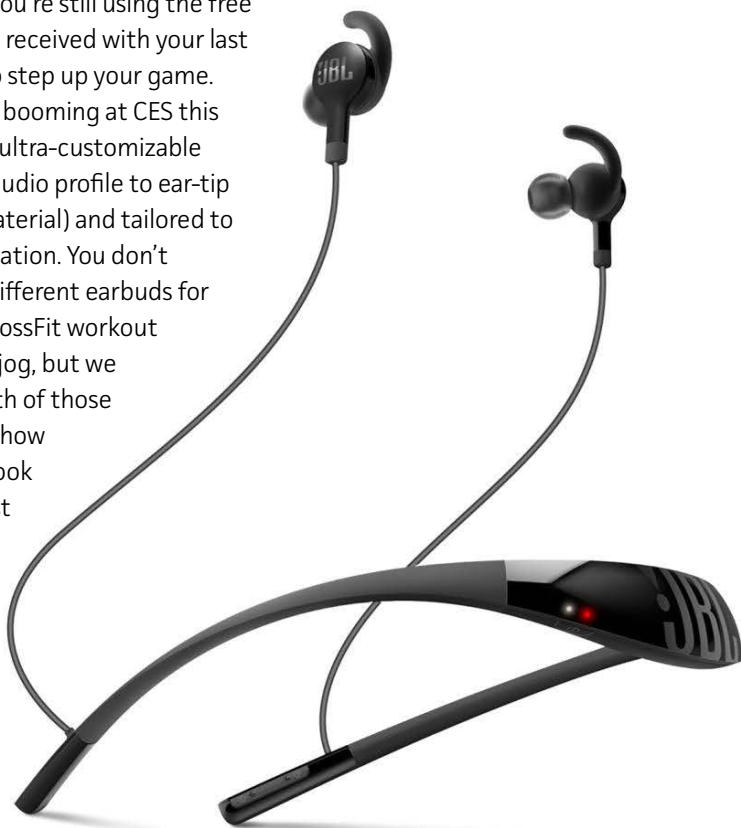
Audio-Technica's SonicPro ATH-MSR7NC ([go.pcworld.com/ATSonicPro](https://go.pcworld.com/ATSonicPro)) might be a game-changer. These Hi-Res Audio-certified circumaural headphones feature proprietary active noise cancellation that works with air vents to maintain top-quality sound. And these headphones do sound excellent, with true but not overpowering bass and detailed audio. They're definitely the best-sounding headphones I've tried with active noise cancellation. The SonicPro ATH-MSR7NC headphones will be available this April, and will retail for \$300. 🔌

# 13 earbuds that will make you rethink portable audio

BY SARAH JACOBSSON PUREWAL

**EARBUDS WILL PROBABLY** never be your main headphones, but that doesn't mean they don't have their place—any time you want to travel light, work out, or simply keep a low profile while listening. If you're still using the free Apple EarPods you received with your last iPhone, it's time to step up your game.

Earbud tech was booming at CES this year, and buds are ultra-customizable (everything from audio profile to ear-tip size, shape, and material) and tailored to just about any situation. You don't necessarily need different earbuds for a high-intensity CrossFit workout versus a midnight jog, but we found buds for both of those situations on the show floor. Let's take a look at 13 of the coolest earbuds coming out this year.





## JBL Everest 100 Elite

Fact: Barring revolutionary new headphone technology, no earbuds are going to replace your noise-canceling over-ear headphones. But JBL's Everest 100 Elite earbuds, which hit shelves this spring for a retail price of \$200, come pretty close.

JBL says the Everest 100 Elites are the only Bluetooth wireless earbuds with 'NXTGen Noise Cancelling technology,' which combines active noise cancellation with the ability to control the amount of ambient noise that seeps in. In other words, the Everest 100 Elites actively filter out all ambient sounds unless you want to be aware of your surroundings. (This is all controlled via JBL's My JBL Headphones app.) The Everest 100 Elites offer up six hours of active playback and feature a plastic neckband for added stability and to prevent wire-tugging.

## Urbanears Reimers

Fitness earbuds are everywhere (you'll find several in this roundup alone), but that's because there's no perfect universal solution—everybody is different, and everybody works out differently. Still, Urbanears' new sweat-resistant Reimers earbuds are both fashionable and functional, with several little features that make them stand out.

Like many fitness headphones, the Reimers have a reflective cable for those who like to walk, run, or cycle outside at night. But instead of just a single reflective stripe, the Reimers' cable has a cool-looking crisscross design that's both eye-catching and safety-focused. These earbuds' wires aren't tangle-free, but they do have handy double clips for winding and managing the cable (or clipping it to your clothing during a rigorous workout). The Reimers are currently available and retail for a reasonable \$50.



## Maroo Audio Gem/Ice

I'm skeptical of tech products marketed specifically to women, but earbuds are a slightly different story because women's ears are typically smaller than men's. While most woman-tech is usually just man-tech painted pink, specialty headphone-maker Maroo Audio has launched two lines (functionally identical but aesthetically different) of smaller, 'girlier' earbuds: Gem and Ice.

The Gem line features bright, sparkly cut glass gemstones, while the Ice line is metallic and bedazzled with tiny crystals. I'm definitely a fan, but I'm somewhat of a sucker for anything shiny. Both lines come with five differently sized smaller ear-tips, which is impressive right off the bat—most earbuds come with three, while some cheaper models come with two—to ensure that smaller-eared customers will be able to find a perfect fit. The Gem and Ice earbuds are currently available for \$79.





### **Verve VerveOnes/VerveOnes+**

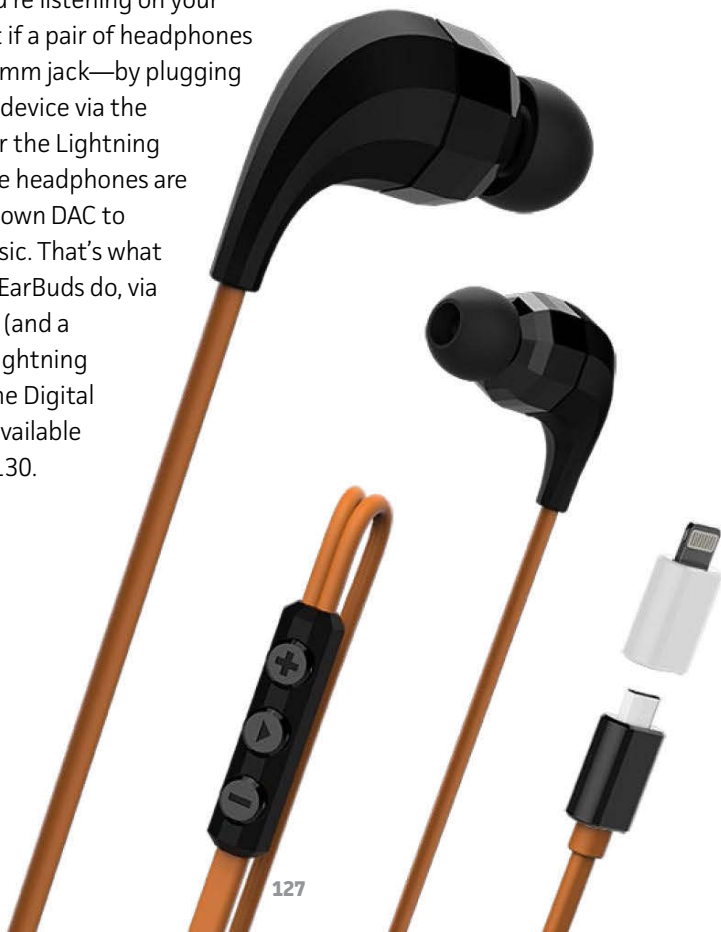
Most wireless Bluetooth earbuds aren't truly wireless: While there's no wire connecting them to your phone, there's still a wire connecting the buds to each other. But Verve's VerveOnes (and their slightly jazzier counterparts, the VerveOnes+) are truly wireless—each bud is its own individual entity. The buds can even be used independently of each other, for example, if you wanted to use just one as a Bluetooth headset for taking calls.

Design-wise, the VerveOnes/VerveOnes+ are still a little bulky for my taste, but they do have some neat features that other truly wireless earbuds do not, such as 12-plus hours of battery life and a portable protective charging case. The VerveOnes+ are IP57-certified, which means they're dust-resistant and waterproof up to one meter for 30 minutes. Both styles will hit shelves this April; the VerveOnes for \$249 and the VerveOnes+ for \$299.

## Phaz Digital EarBuds

Phaz Music, the company that brought us the gimmicky (and ultimately underwhelming) phone-charging headphones, is back with a pair of digital earbuds that just may be worth your money. Phaz' Digital EarBuds are wired earbuds with 9mm drivers and a premium digital-to-analog converter (DAC) onboard.

But first, a little background: Your iPhone/Android device has its own built-in DAC, which is what your music goes through if you use the device's 3.5mm headphone jack. Because your mobile device's DAC may not (read: is not) very good, even stellar headphones will sound limited when you're listening on your smartphone. But if a pair of headphones bypasses the 3.5mm jack—by plugging directly into the device via the microUSB port or the Lightning port—then those headphones are free to use their own DAC to convert your music. That's what the Phaz Digital EarBuds do, via a microUSB plug (and a corresponding Lightning port adapter). The Digital EarBuds will be available this March for \$130.







## **iHome iB80**

iHome's iB80 Bluetooth sports earbuds are the perfect compromise for people who want the freedom of wireless earbuds without the hassle of tangling with the connecting wire. The iB80's connecting wire is seamlessly integrated into a flexible, rubberized neckband that gives you fit stability without the rigidity of a plastic neck piece. The neckband is flexible enough to be folded into a ball and tossed in your gym bag (the iB80s are also IPX3-certified, which means they're sweat- and water-resistant, but not waterproof). These earbuds feature an over-ear loop design, an inline remote (on the right bud), and six-hour battery life. The iB80s are reasonably priced at \$50 and will be available soon.

## Skullcandy Smokin' Buds 2 Wireless

Skullcandy is best known as a lifestyle audio brand, so it's no surprise that the company is taking its popular wired Smokin' Buds 2 earbuds into Bluetooth territory. The new wireless earbuds—not-so-creatively dubbed the Smokin' Buds 2 Wireless—feature the same off-axis fit technology as their wired predecessors, with angled, oval-shaped tips that allow for a more secure (and thus, more noise-isolating) fit.

Because the Smokin' Buds 2 Wireless are designed to be worn all day long—even when you're not actively listening to music—Skullcandy has included a removable neckband (a 'flex-collar') for when you want the buds to hang securely around your neck. The neckband adds

stability to the buds and prevents wire-tugging, but can be removed if you prefer less weight. The Smokin' Buds 2 Wireless are available now for \$60, which is twice the cost of the original Smokin' Buds 2, but still significantly lower than what you'll pay for most wireless earbuds.





## Jaybird Freedom

It's obvious where Jaybird's Freedom earbuds got their name: These tiny wireless Bluetooth earbuds are so lightweight that you'll (almost) feel like you're completely free from wires altogether. The Freedoms pack big sound into such a tiny package, with 6mm drivers (in a special step-down design) and integration with a special app that lets you tweak the earbuds' audio profile and save said profile to the buds themselves (instead of just to your audio device, like a typical equalizer app).

Like other Jaybird earbuds, the Freedoms are fitness-oriented, with Comply memory foam ear-tips, flexible mesh ear-fins, and a sweat-proof design. They only get four hours of battery life, but they come with a slim charging clip that can be attached for an additional four hours of battery life. The Freedoms will be available this spring and will retail for \$200.

## Audio-Technica ATH-CKS1100iS

Earbuds don't usually feature excellent bass, because it's practically impossible to do so with tiny, earbud-sized drivers. But Audio-Technica's Solid Bass line does a decent job of bumping up your bass line thanks to larger, dual phase push-pull drivers.

The ATH-CKS1100iS earbuds aren't particularly fashion-forward, but they do have some little touches that audiophiles on-the-go will appreciate, such as separate star-quad cables for the left and right buds. These earbuds, which are available now for \$200, have dual 12.5mm drivers, are certified for high-res audio, and have an impressive (and possibly exaggerated) frequency response of 5- to 40,000Hz.





## Skullcandy XTfree

Skullcandy claims its XTfree earbuds are the lightest wireless Bluetooth earbuds on the market, though the company admitted that it don't know what would launch at CES this year. These fitness-focused wireless earbuds weigh just 16 grams and are designed to withstand a rigorous workout. The XTfrees are not only sweat-resistant, the ear-tips are actually made of a special sticky gel that gets 30-percent stickier (and therefore more stable) when exposed to sweat. In other words, the sweatier you are, the more tenacious these earbuds will get.

The XTfrees also have a flexible ear-fin/arm that locks into your outer ear for extra stability. These earbuds get six hours of battery life (the battery is in the buds, not anchored on the cable) and are available now for \$100.

## JBL UA Headphones Wireless Heart Rate

JBL and fitness-apparel company Under Armour have teamed up to introduce a pair of sleek wireless heart-rate-monitoring earbuds. The JBL UA Headphones Wireless Heart Rate are the first wireless earbuds with heart-rate-monitoring built-in, which means they're likely to be a hit. A rep from SMS Audio told me that the wire on their BioSport earbuds was the only deal breaker for many consumers.

The JBL UA earbuds also benefit from JBL's ownership of Yurbuds. The ear-tips on the JBL UA Headphones Wireless Heart Rate earbuds are very similar to Yurbuds' patented twist-lock ear-tips, which make absolutely no logical sense but stay in place like nobody's business. The JBL UA earbuds will be available this summer and will cost \$250.





## **Decibullz Wireless Earphones**

Decibullz has a unique answer to the elusive perfect fit: Custom-molded earpieces. Drop Decibullz' earpieces in boiling water and then squish them into your ear, and in a couple of minutes you'll have perfectly-fitting custom earpieces that attach easily to Decibullz' new wireless Bluetooth earbuds.


The new earbuds feature 9mm drivers, 4.5 hours of battery life, and are sweat-resistant (though not IP-certified). The Decibullz' earpieces come in seven colors (black, red, blue, orange, green, light blue, purple, and brown) and can be infinitely re-molded to better fit your ears. The wireless earbuds will be available in February or March of this year, and will retail for \$129.



## Kanoa Wireless Headphones

I saw a few different “truly wireless” Bluetooth earbuds at the show this year, but Kanoa’s wireless earbuds are definitely the sexiest. These pentagon-shaped buds only get six hours of battery life, but they’re so much smaller, lighter, and more comfortable than their competitors that I can safely say the trade-off is worth it. They’re also IP67-certified, which means they’re completely dust-proof and waterproof up to one meter for 30 minutes.

The Kanoa earbuds come with a portable protective charging case and three sets of silicon ear-tips, three sets of silicon jackets, and one set of memory foam ear-tips. The first batch is currently available for pre-order (\$149); units will start shipping in April and will eventually retail for \$299.

Don’t miss our coverage of the most interesting loudspeakers we heard at CES ([go.pcworld.com/ces16loudspakers](http://go.pcworld.com/ces16loudspakers)). 



I was one of the **1** in **5**  
Children in America who  
**STRUGGLE WITH HUNGER**  
join me and help put an  
End to childhood hunger.

Viola Davis



**HUNGER IS  
ALL OF US**

**HELP UNDO CHILDHOOD HUNGER. GO TO [HUNGERIS.ORG](http://HUNGERIS.ORG)**

THE  
**SAFeway**  
FOUNDATION

The *Hunger Is* campaign is a collaboration between The Safeway Foundation and the Entertainment Industry Foundation to raise awareness and improve the health of hungry children.

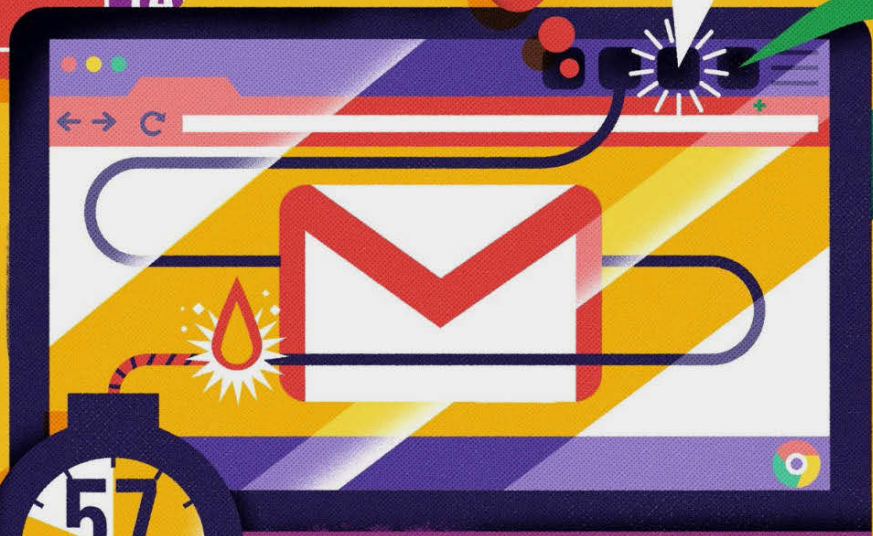
**EIF**  
ENTERTAINMENT  
INDUSTRY FOUNDATION

The Safeway Foundation and the Entertainment Industry Foundation are 501(c)(3) tax-exempt organizations. Photo by: Nigel Parry

FEATURE

VED 20TH JAN  
THU 21ST JAN

FRI 29TH JAN



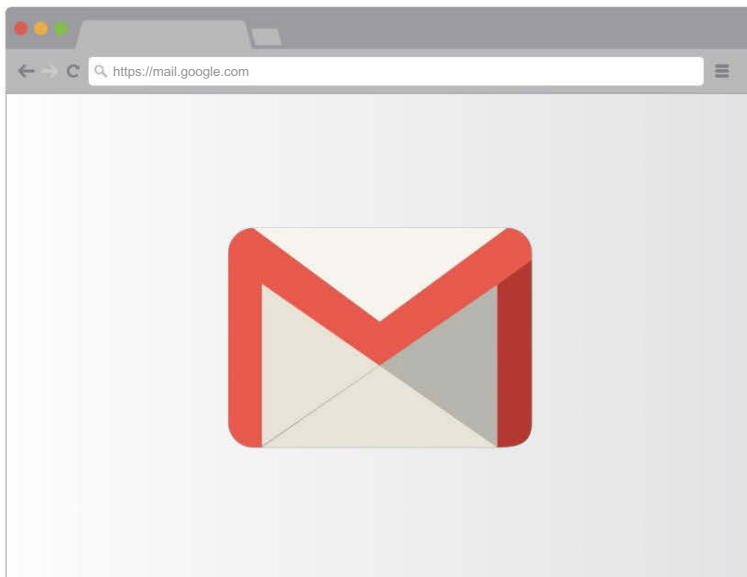
# These 4 Chrome extensions make Gmail better right now

Gmail add-ons will track your messages, schedule your meetings, and more.

BY MICHAEL ANSALDO

ILLUSTRATION BY DALE EDWIN MURRAY

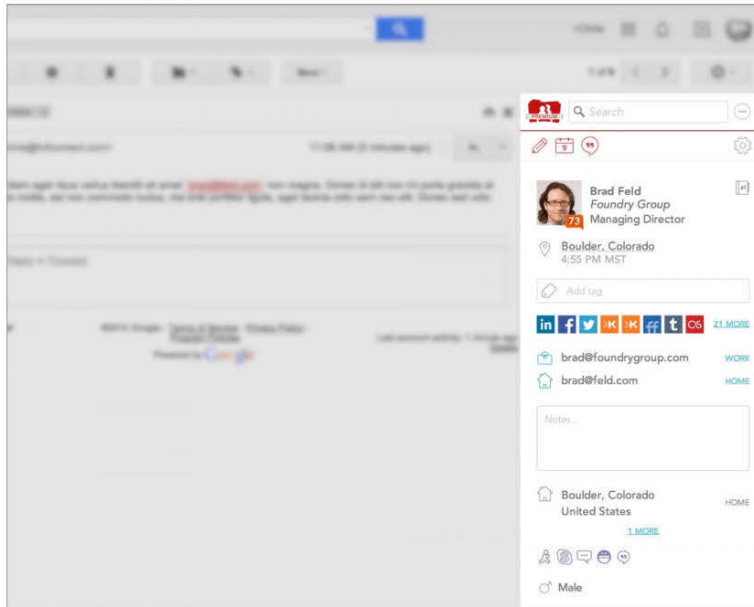
Gmail raised the bar for what we expect in an email service. But if you're only using its native features, you're getting just a taste of its power. There are a wealth of Chrome extensions that expand Gmail's capabilities and help you streamline your workflow. Here are four you should install today.



## 1. FULL CONTACT

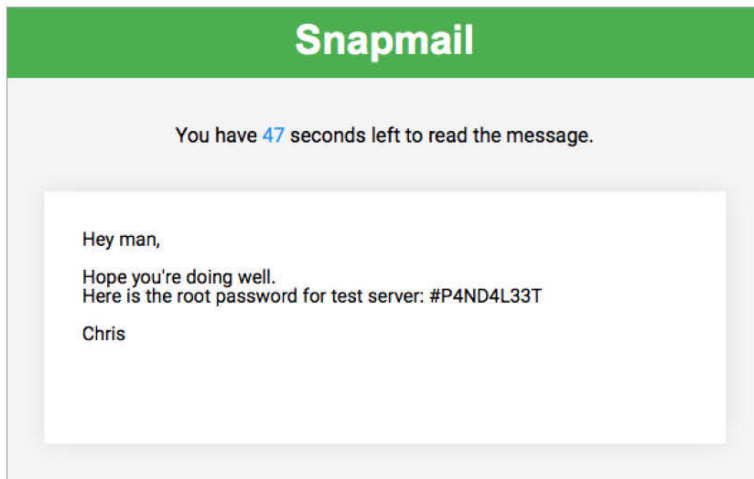
Most of us have a similar reaction when we receive an email from a new professional contact. We immediately try to learn more about them by searching their profiles on LinkedIn, Facebook, Twitter, and other social networks.

Full Contact ([fullcontact.com](http://fullcontact.com)) eliminates that legwork by providing the job titles, company details, and social accounts for each email sender. Without leaving your inbox, you can scroll through their Facebook posts, tweets, and other social updates. Add your own notes, then sync all the contact's info to your address book so you'll always have it at hand.



**Full Contact** shows you email senders' social profiles and other details.





**Snapmail encrypts and destroys** sensitive email messages.

## 2. SNAPMAIL

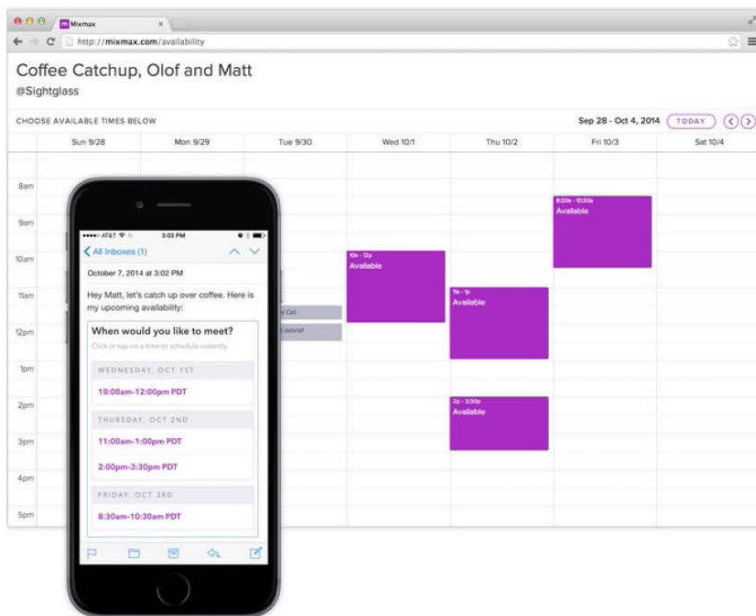
We don't recommend emailing passwords and similarly sensitive material. But if you absolutely must, this Mission Impossible-style extension ([snapmail.co](https://snapmail.co)) will ensure your message is seen by authorized eyes only.

It adds a Snapmail button next to the Send button in your message. Pressing it encrypts the message and creates a URL for the message, which is sent to the recipient. Once they follow the link, a countdown timer informs them that the message will self-destruct in 60 seconds.

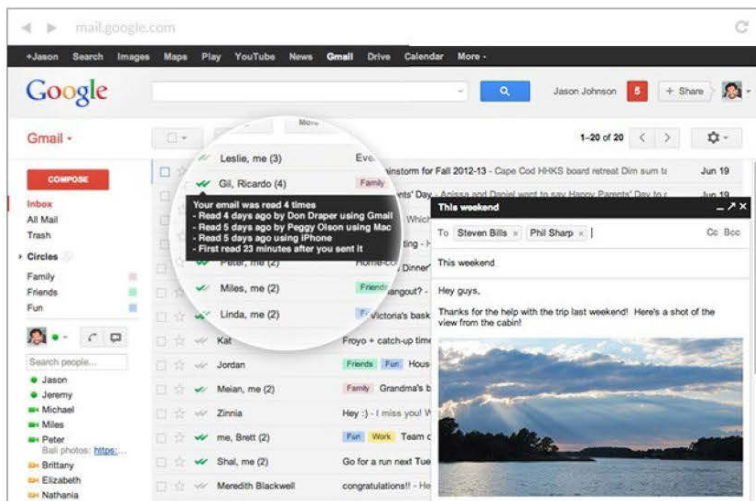
### 3. MIXMAX

MixMax ([mixmax.com](http://mixmax.com)) delivers on its promise to “make email awesome.” The extension adds a host of must-have functions to Gmail, including email tracking, one-click business templates, and “send later” scheduling.

Its Instant Scheduling is particularly useful for setting up one-on-one meetings. MixMax does all the heavy lifting so you and the other party don’t have to email back and forth to find a time that works for you both. You select available times from your Google Calendar, and MixMax adds them to your email. Your recipient selects whichever one works for them, and MixMax puts it on your calendar and sends each of you a confirmation message. It’s like having your own personal assistant.



**MixMax** adds several functions to Gmail, including “instant” meeting scheduling.




## The MailTrack extension

lets you know which recipients have read your email, even in a bulk message.

## 4. MAILTRACK

MailTrack ([mailtrack.io](http://mailtrack.io)) removes the mystery around unanswered emails. This extension is a simple email tracker that uses checkmarks to keep you apprised of your message's status. It adds one checkmark next to the message when it's sent and adds a second once the message has been read. Best of all, it can tell you exactly which recipients have read a message sent to multiple parties.

MailTrack's basic functions are free for an unlimited number of emails. For \$3.50 a month you can add options including real-time desktop notifications and daily tracking-activity reports. 



# Plant a Billion rees

Join The Nature Conservancy to plant a billion trees,  
one tree at a time, in the fight to end climate change  
at [plantabillion.org](http://plantabillion.org)

The Nature  
Conservancy   
Protecting nature. Preserving life.™



YEAR-TO-DATE SUMMARY				Jan
Average	Total	Rank		
\$666,457	\$7,997,484	2		\$808,500
\$420,615	\$5,047,377	38		\$905,000
\$422,552	\$5,070,623	37		\$867,000
\$554,138	\$6,649,651	12		\$570,000
\$46,704	\$7,760,443	4		\$570,000
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	\$5,873,918	23		\$570,000
	\$5,177,568	35		\$570,000
				\$570,000

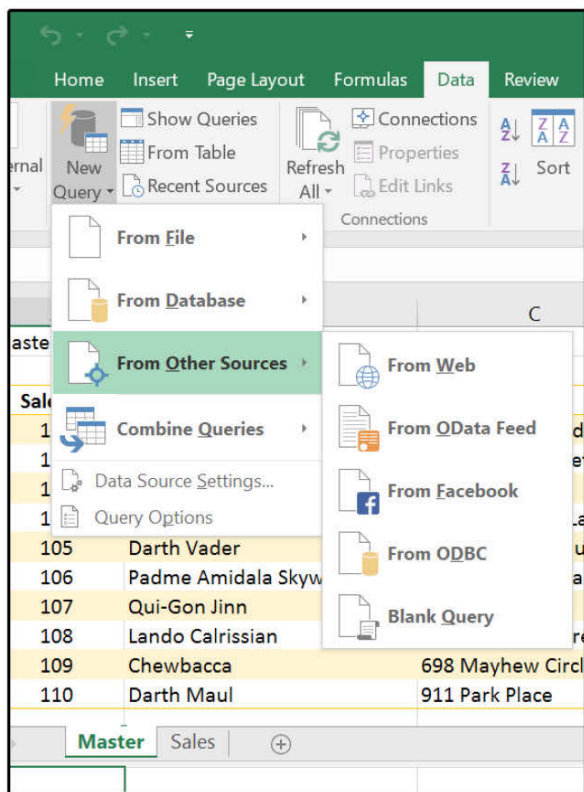
# MEET EXCEL 2016:

## 9 OF ITS BEST NEW FEATURES, FROM DATABASES TO HANDWRITING TOOLS

The new database features alone justify upgrading, but that's just the beginning.

BY JD SARTAIN

I've just started exploring Excel 2016. As one of the tentpole applications for the new Office 2016, it has a raft of new features for lucky upgraders. Take a closer look with me and see what you think.



## 1. Major database enhancements

The database enhancements alone—which include merging some of the previous Add-On programs such as Power Pivot and Power Query—more than justify the upgrade. You'll find options for Power Queries; Data Models; Reports; Pivot Tables; One-Click Forecasting; and some new, one-button workbook sharing through Power BI for creating and using interactive reports and dashboards.

## 2. Quick analysis tools

Quick analysis tools are a real time-saver, nudging you in the right direction with your data. After you've completed your spreadsheet or table, select the entire range. Note the lightning worksheet icon at the bottom right corner of the range: Click this icon, and a pop-up menu appears that displays a half-dozen options for what to do with this data.

The screenshot shows the Excel 2016 interface. The ribbon includes 'Formulas', 'Data', 'Review', 'View', 'Design', and 'Tell me what you want to do'. The 'View' tab is active, showing options like 'Formula Bar', 'Headings', 'Zoom', 'Zoom to Selection', 'New Window', 'Arrange All', 'Freeze Panes', and 'Show'. The main data area is titled 'A. Datum Corporation' and contains a table with the following data:

Industry	Q1 Sales	Q2 Sales
Utilities	\$ 299,293	\$ 674,295
Beverage	\$ 228,783	\$ 659,385
Tech	\$ 579,825	\$ 448,399
Medical	\$ 371,570	\$ 644,368
Misc	\$ 239,219	\$ 287,989
	\$ 639,630	\$ 635,474
	\$ 876,740	\$ 567,216
	\$ 788,390	\$ 540,282
	\$ 682,545	\$ 577,599
	\$ 902,264	\$ 206,331
	\$ 905,906	\$ 443,552
	\$ 289,570	\$ 843,834

At the bottom of the selected range, a lightning bolt icon is visible. Two pop-up menus are shown:

- Charts:** Recommended Charts help you visualize data. Options include Clustered Column, Clustered Bar, Clustered Column, Scatter, and More Charts.
- Totals:** Formulas automatically calculate totals for you. Options include Sum, Average, Count, % Total, Running Total, and Sum of Squares.

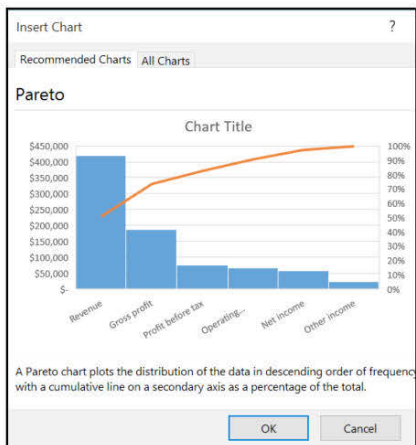
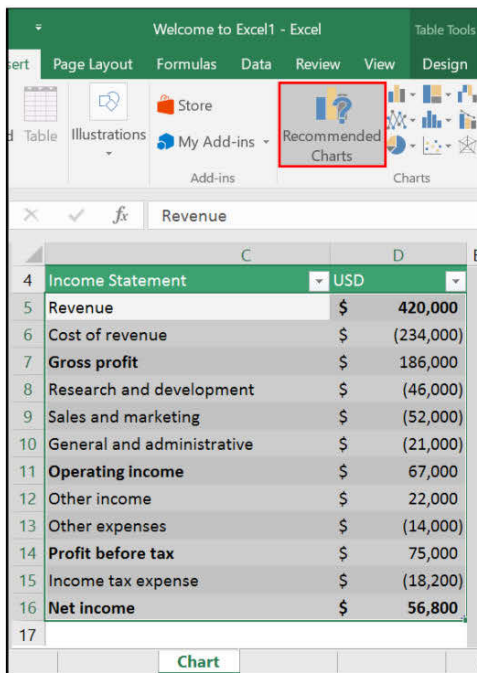
Note that each icon is a button/link to a submenu that provides more options (the selected icon turns dark green and bold).

### 3. New charts

Excel has six new charts to show off to your clients and colleagues. It's still an easy process to create them, too: Just highlight the database table, select Insert > Recommended Charts, then choose one from the pictured samples.

Or, if you're not inclined to use one of the recommendations, click the All Charts tab, choose a category from the list, then select one of the designs from the pictured charts in that category.

We'll delve deeper into the new charts in an upcoming column, but here are two to whet your appetite:

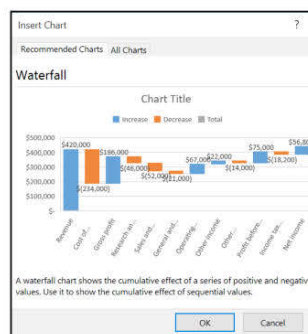


**Pareto** sorts the bars by highest first and shows which bars have the biggest impact or highest return. Use this chart data to decide where to assign your resources.

### Waterfall

(aka 'flying brick' chart) provides a visual method for viewing a series of positive and negative data, such as

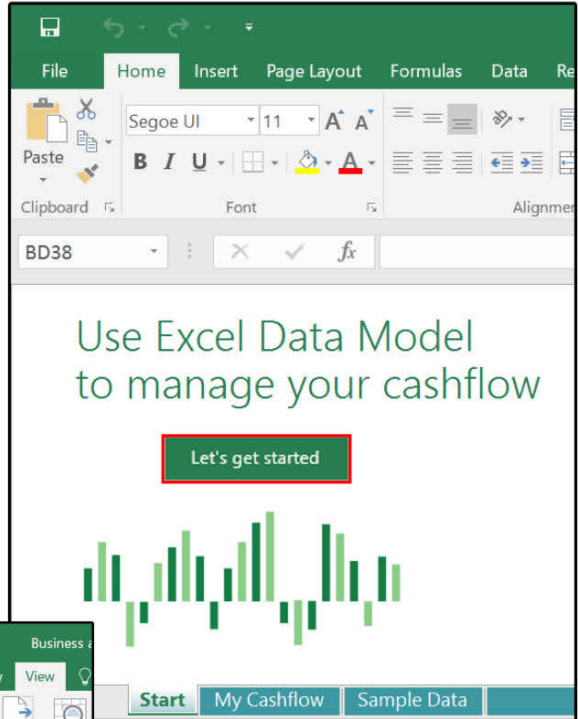
monthly cash flows. Because the bars seem to hover between the start and end columns, it looks sort of like a waterfall, hence the name.



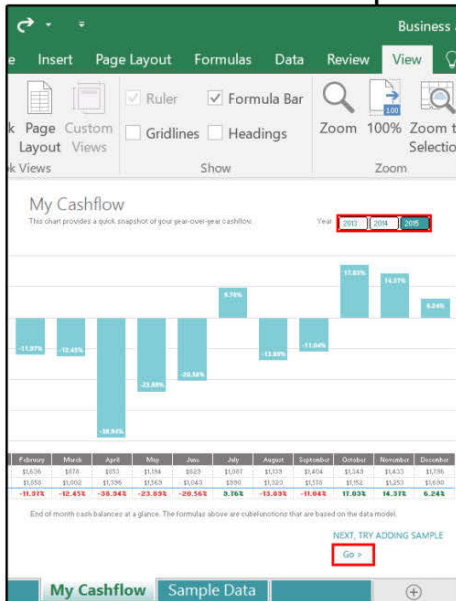
## 4. New templates

Excel's new templates come with sample data and charts, plus hands-on exercises that teach you how to use each template.

For example, in the My Cashflow template, Excel encourages you to try the Excel Data Model to manage your cash flow. Click the Let's Get Started button, and Excel displays the My Cashflow charts. Click the buttons 2013, 2014, or 2015 to see the chart data change by year.



Click the Let's Get Started button (above).

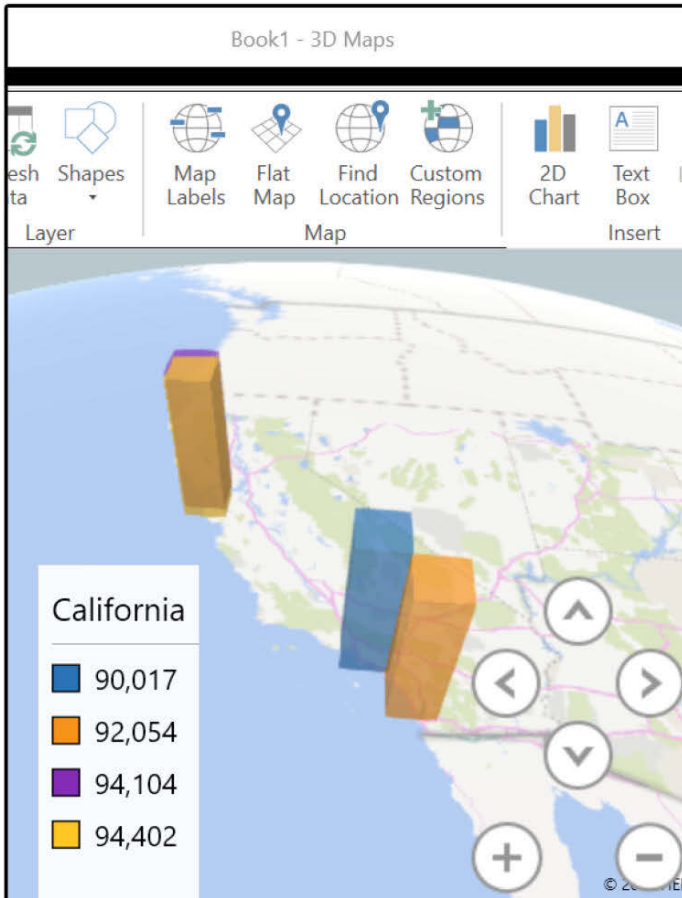


If you click the Go button (left), you can add some new data to the Sample Data spreadsheet, then watch the charts change based on your new input. Once you get the hang of it, just replace Excel's sample data with some real data of your own and Excel does the rest. Other new templates include Stock Analysis and My Calendar.

## 5. 3D/Power Maps

These mapping tools were an add-in program in previous versions, but they're now included in 2016. You can compare data such as temperatures, or rainfall, or populations of a given area over a specified time, rendered in three-dimensional images.

You can map data (plot millions of rows of information visually on Bing maps), discover how data changes over time and space, and create and share stories (called Video Tours) about the information you've collected. Stay tuned for a complete review on this excellent new feature in Excel 2016.

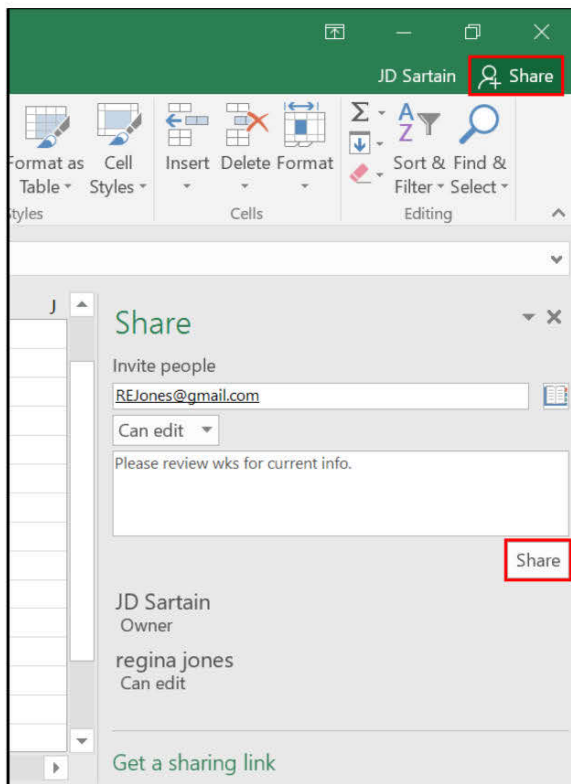


## 6. Easier collaboration and sharing

Real-time collaboration is finally here. Share ideas, data, queries, and reports; and co-author worksheets, charts, graphs, Pivot Tables, databases, and more.

Click the Share button in the top right corner. When the Share panel opens, click the Save To Cloud button. The Backstage menu opens and displays the Save As screen. Choose the option that fits your situation—OneDrive, SharePoint, or another online location. Select the appropriate folder and click the Save button.

Once saved, the document reappears with the Share panel open. In the Invite People field, click the open-book icon and select colleagues from your address book in Outlook. Set permissions and notifications, then click the Share button to send the document links to your designated colleagues.

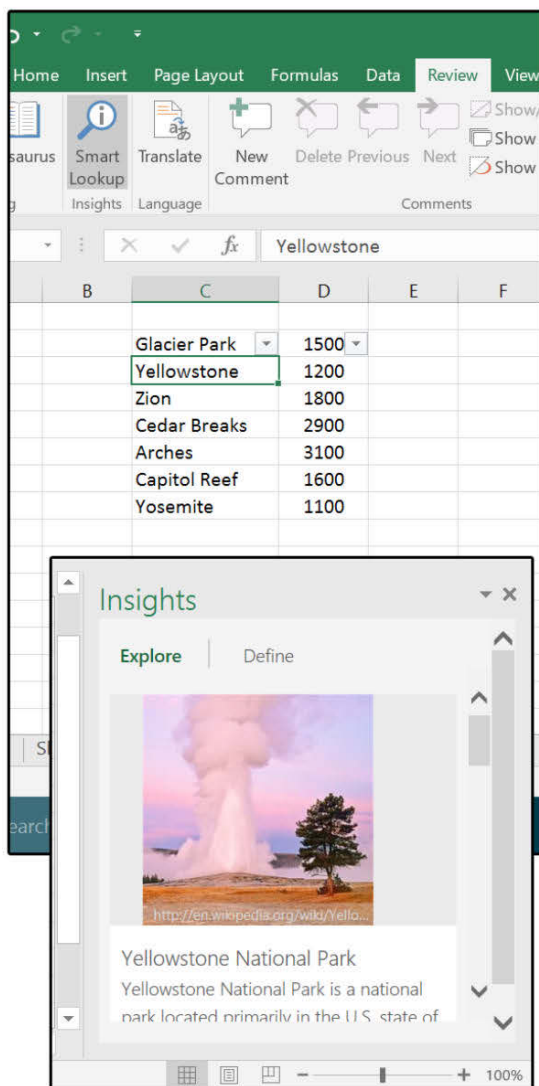




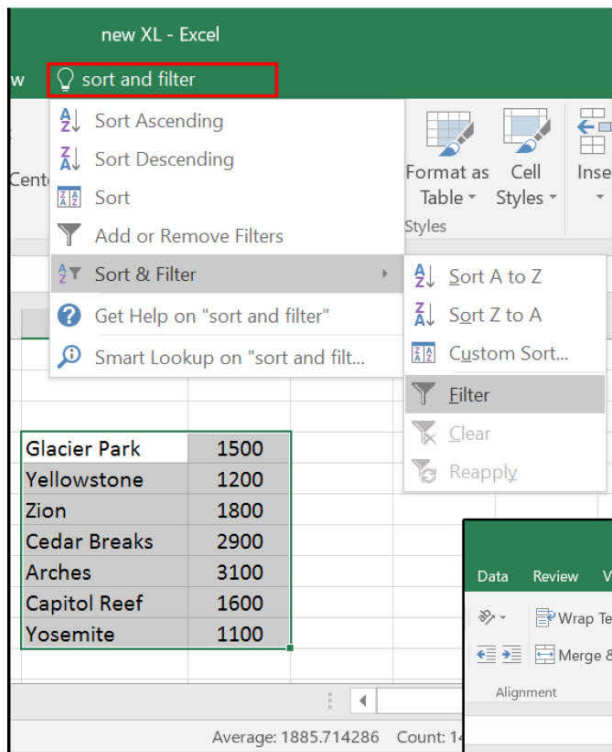
## 7. Smart Lookup

This feature (available in most of the Office 2016 programs) is like having the Internet on speed dial. Also called Insights from Bing, the information hails from various resources such as Wikipedia, the Oxford dictionary, Bing image search, and Bing Snapshot.

Just place your cursor on any word or highlight any phrase on your spreadsheet and right-click. Select Smart Lookup from the drop-down list. The Insights panel opens on the right and displays information and images about the subject you highlighted.



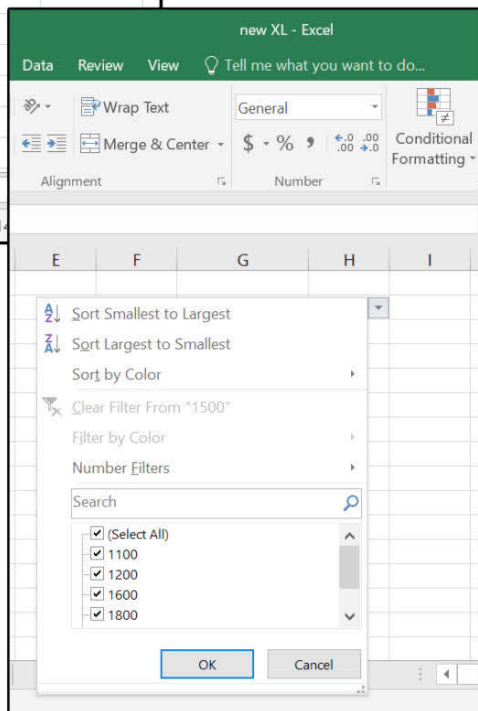




Just click the Tell Me box and type your question. A list-box drops down with your current request on top; followed by alternate choices (if there are any); followed by the most Recently Used queries; followed by an option to select and use the official Help menus; followed by the Smart Lookup feature, which adds the knowledge of the Internet to help you find the right answer.

## 8. Tell Me

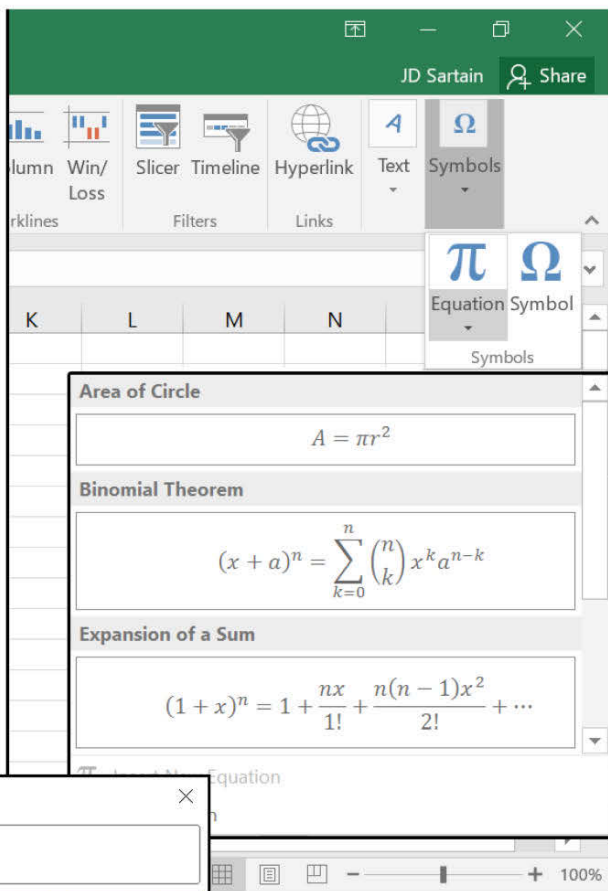
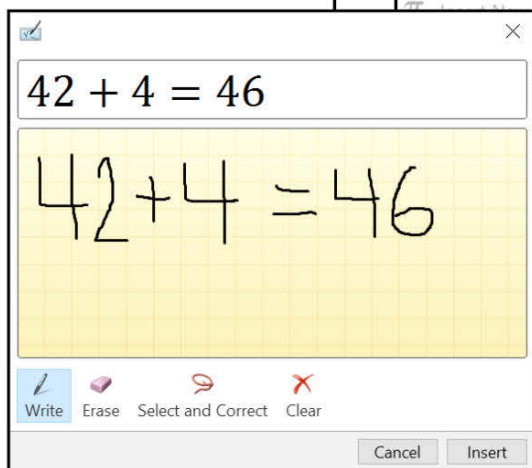
Located on the right side of the Ribbon menu after the last tab, this feature provides a search box with a light bulb that says "Tell me what you want to do." It's like your personal valet: Ask it a question, command it to do something, or select one of the Recently Used queries, and it obeys.



## 9. Ink Equations

This new feature converts your handwritten equations (or mathematical problems) to text, so you can insert them into your documents. You can use whatever tool works best for you—the mouse, a digital or light pen, or even your fingers—to write the math equations/problems.

Just select Insert > Symbols > Equation, then click Ink Equation from the drop-down menu. A Preview chalkboard box appears with writing tools displayed along the bottom.



That's all for the big stuff, and Excel has a lot more surprises for its fans. Stay tuned for deeper dives into more of the great features in Excel 2016.

Thanks for leaving  
your car here last night  
and not ending my  
family's lives.

Tara Inskip



**SAVE A LIFE. DON'T DRIVE HOME BUZZED.**  
BUZZED DRIVING IS DRUNK DRIVING.



**U.S. Department of  
Transportation**

# HERE'S HOW

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## Three ways to fix Windows 10 password problems

Windows 10 would like you to use your Microsoft account to log in, but you can change to another password, or set up a PIN or a local account.

BY LINCOLN SPECTOR

**ABDI HAMID MALIK** upgraded to Windows 10, and it changed his login password to his Hotmail password. (Hotmail passwords are also Microsoft passwords.)

Microsoft really wants to attach your Windows environment to your online Microsoft account. Whether you think it's a good thing

depends on how you balance convenience with privacy—and how much you trust Microsoft.

But even if you vote for convenience, you may not want to log in with your Microsoft password, which may be harder to remember or type than a Windows login password.

Here are three solutions:

## Change Microsoft password

If your Microsoft password is too difficult to type every time you boot or wake up your PC, change it to something simple.

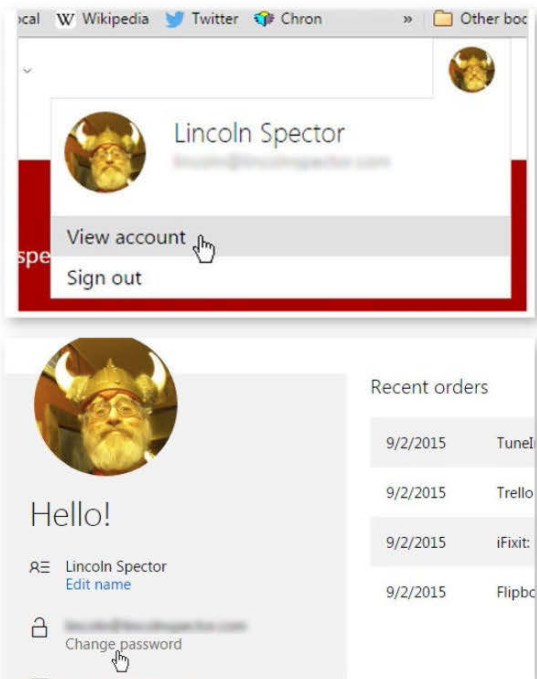
But not anything too simple. Online passwords are more prone to hacking than local ones. It should still be long, complex (letters, numbers, punctuation), and impossible to guess—even if it's also easy to remember and type.

If you come up with such a password, go to [www.microsoft.com](http://www.microsoft.com). Log in if need be. Click your avatar in the upper right corner and select View Account. On the resulting page, click Change password and then follow the instructions.

## Use a PIN

You don't have to use your Microsoft password to log in to Windows 10. You can use a PIN instead.

How can a PIN, which contains only numbers, be as safe as a password that can contain numbers, letters (upper- and lowercase), and punctuation? By staying local. Your PIN doesn't travel the Internet where it's more likely to be hacked.



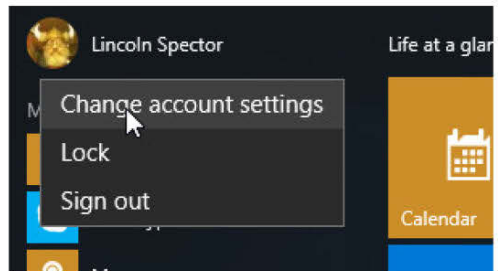
**About that Viking helmet...**it's a long story.

Another layer of protection: A Windows 10 PIN isn't restricted to four digits. You could use six digits, or seven, or ten. Remember that each additional digit makes the PIN ten times harder to crack.

To make the change, click your avatar at the top of the Start menu and select Change Account Settings.

Select Sign-in options in the left pane, then click the Add button in the PIN section and follow directions.

One note: You may, from time to time, need to use your Microsoft password instead of your PIN—for instance, if you boot into Safe Mode. So don't forget it.




**To make the** change, click your avatar at the top of the Start menu and select Change Account Settings.

## Use a local account

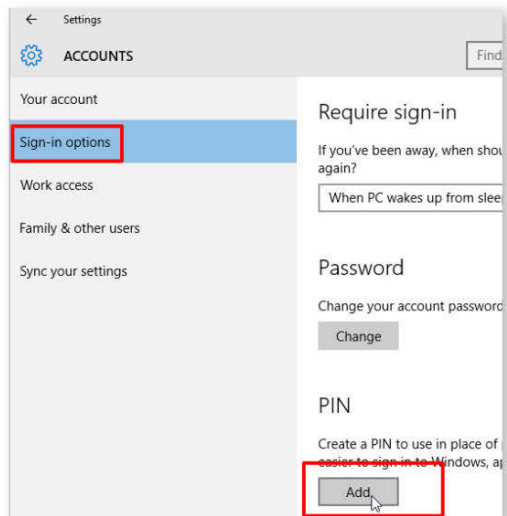
Your Windows 10 login doesn't have to be your Microsoft account. You can convert it to a local account, instead.

But you'll lose a few features. Windows won't work as seamlessly with OneDrive, and Cortana doesn't work with a local account. And you'll have to log in to your Microsoft account in the Store app.

To localize your account, open Change Account Settings as described above. In the Your Account section, select Sign In With A Local Account Instead and follow the directions.

You won't be allowed to use your Microsoft login name. And you can use any password you want. 

**Select Sign-in Options** in the left pane.





# 5 hacks for getting more out of Gmail

BY MICHAEL ANSALDO

**YOU MAY THINK** you know all you need to know about Gmail to manage your account, but it's always safe to assume the powerful service has more up its sleeve. In fact, many of its coolest features may slip by you if you don't know where to look. Here are five tips for getting more out of what Gmail has to offer.

## **Easily unsubscribe to bulk emails**

As good as Gmail's spam filter is, it can't catch everything, and bulk email messages will inevitably find their way into your inbox. Fortunately, there's an easy way to weed them out.

Just type "unsubscribe" into Gmail's search box and it will respond with a cascade of daily deals, newsletters, and other offers to which



## Activity on this account

This feature provides information about the last activity on this mail account and any concurrent activity. [Learn more](#)

This account does not seem to be open in any other location. However, there may be sessions that have not been signed out.

[Sign out all other web sessions](#)

### Recent activity:

Access Type [ ? ] (Browser, mobile, POP3, etc.)	Location (IP address) [ ? ]	Date/Time (Displayed in your time zone)
Browser (Firefox) <a href="#">Show details</a>	* United States (CA) (192.168.1.100)	12:53 pm (0 minutes ago)
Authorized Application (Google Chrome (googlechromecast.com)) <a href="#">Show details</a>	United States (VA) (192.168.1.100)	12:51 pm (1 minute ago)
Browser (Firefox) <a href="#">Show details</a>	* United States (CA) (192.168.1.100)	10:41 am (2 hours ago)
Browser (Firefox) <a href="#">Show details</a>	* United States (CA) (192.168.1.100)	10:11 am (2.5 hours ago)
IMAP () <a href="#">Show details</a>	United States (CA) (192.168.1.100)	9:31 am (3 hours ago)
SMTP	United States (CA) (192.168.1.100)	9:31 am (3 hours ago)
SMTP	United States (CA) (192.168.1.100)	9:29 am (3 hours ago)
SMTP	United States (CA) (192.168.1.100)	9:27 am (3 hours ago)
IMAP () <a href="#">Show details</a>	United States (CA) (192.168.1.100)	Dec 8 (18 hours ago)
Authorized Application (Google Chrome (googlechromecast.com)) <a href="#">Show details</a>	United States (VA) (192.168.1.100)	Dec 8 (18 hours ago)

**Alert preference:** Show an alert for unusual activity. [change](#)

you've long since forgotten subscribing. To stop receiving a message, open it and either click the unsubscribe button Gmail places next to the sender's address on promotional emails or look for an unsubscribe link at the bottom.

**Use the activity**  
log to see who has been logging in to your Gmail account.

## Take advantage of email “aliases”

If you just can't help yourself and know you're going to continue to subscribe to offers and email notifications, use this hack to keep the influx organized.

Gmail doesn't use traditional aliases, but it does let you create alternate addresses by adding a plus sign followed by words or numbers after your email address. You can use this to your advantage to sort your subscriptions. For example, if you wanted to sign up for Groupon, enter your email address as John.Smith+groupon@gmail.com. Then set up a filter to apply a label or star to these messages, have them bypass your inbox, or otherwise redirect them.

## Supercharge your stars

Gmail uses a yellow star to bookmark or prioritize messages. The problem is if you “star” a lot of email, you can quickly create another disorganized tier within your inbox.

But it's a little-known fact that Gmail actually offers a range of colored stars ([go.pcworld.com/gmailstars](http://go.pcworld.com/gmailstars)) and even other icons you can use to impose order on your important emails. For example, you can use different colored stars for different priority levels or use a red exclamation point for messages that need an urgent reply.

Just go to Settings > General and scroll down to Stars. Drag the stars or symbols you want to add from the Not In Use category to In Use. To apply one of the new icons to a message, click the star next to it repeatedly until you see the symbol you want to use.

## Keep tabs on your account activity

They may not get the headlines like other types of security breaches, but email hacks do happen ([go.pcworld.com/emailhacks](http://go.pcworld.com/emailhacks)). You can monitor your own Gmail activity if you know where to look.

Scroll all the way to the bottom of your inbox and look for the Details link in the right corner. Click it to see information on the last 10 times your Gmail account was accessed. This log shows you the access type—browser, mobile, POP3, etc.—the location and IP address, and the time of activity. From here, you can also log out of Gmail from another computer by hitting the Sign Out All Other Web Sessions button.

**Drag the stars between the lists.** The stars will rotate in the order shown below when you click successively. To learn the name of a star for search, hover your mouse over the image.

Presets: 1 star 4 stars all stars

In use: ★

Not in use: ★ ★ ★ ★ ★ ! ! ! ! ! ! ! !

**Use Gmail's full** palette of stars and symbols to prioritize your messages.

## Manage an inactive account

We can't imagine you'd ever want to stop using Gmail, but nonetheless you should decide how you'd want your data handled if that day should come. You can do this with Google's Inactive Account Manager ([go.pcworld.com/googleinactive](https://go.pcworld.com/googleinactive)).


This fail-safe helps Google determine when your account should be treated as inactive, what to do with your data, and whom to notify. You just need to customize four settings:

**Timeout period**—you designate a length of time starting from your last login after which your account can be considered inactive.

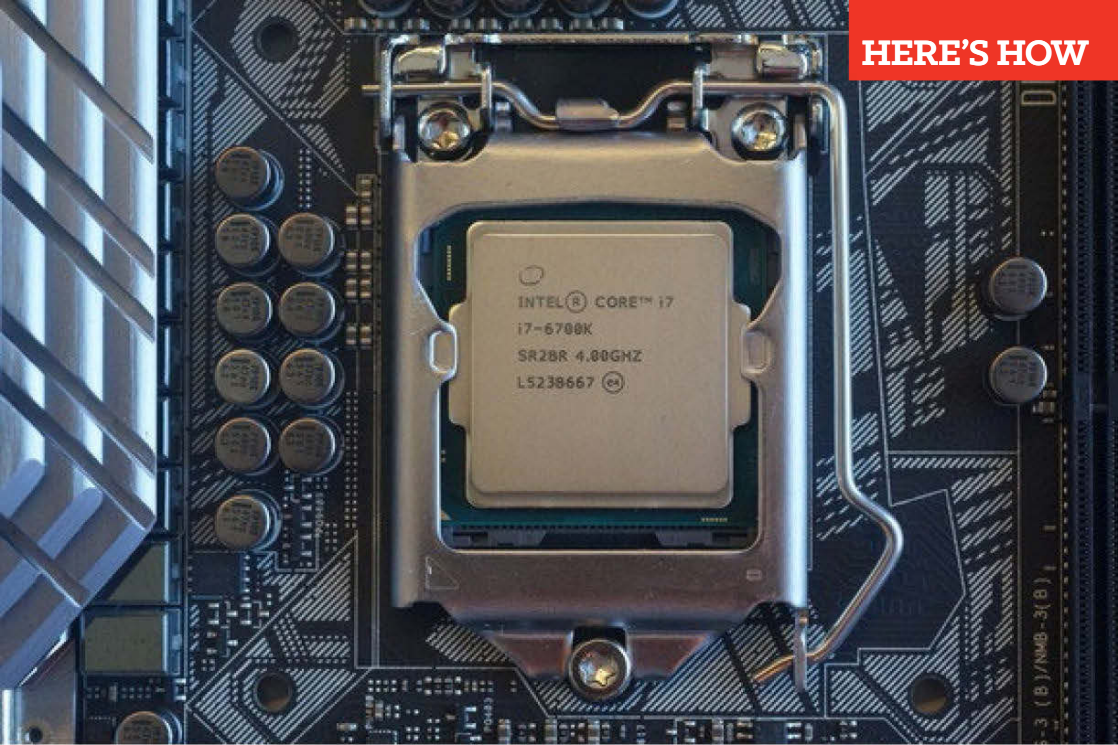
**Alert me**—you provide a mobile number and additional email addresses by which Google can alert you. It will do so one month before your timeout period ends.

**Notify contacts and share data**—you can add up to 10 people to be notified when your account is inactive and elect whether or not to share data with them.

**Optionally delete account**—toggle this switch to Yes if you want Google to delete your account and all data associated with it once all the previous steps have been completed.

These measures go into play if you don't access your account for a length of time for any reason, so it's worth taking the time to configure them. 

They may not get the headlines like other types of security breaches, but email hacks do happen.



# How to test your PC for the Skylake bug

BY GORDON MAH UNG

**INTEL HAS CONFIRMED** a bug in some Skylake CPUs could cause them to lock up under “complex workload conditions” but noted that a fix is on the way.

The bug initially was reported only with the Core i7-6700K desktop CPU with Hyper-Threading enabled, but Intel’s confirmation seems to indicate it impacts more CPUs in the lineup.

In a post ([go.pcworld.com/intelskylakebug](http://go.pcworld.com/intelskylakebug)) on Intel’s forums, an Intel community manager wrote: “Intel has identified an issue that potentially affects the 6th Gen Intel Core family of products. This issue only occurs under certain complex workload conditions, like those that may be encountered when running applications like Prime95. In

those cases, the processor may hang or cause unpredictable system behavior. Intel has identified and released a fix and is working with external business partners to get the fix deployed through BIOS.”

The bug has apparently been stewing for weeks on forums at [hardwareluxx.de](http://hardwareluxx.de) and then [Mersenne.org](http://Mersenne.org) which created the software, [Prime95](#), that is used to induce the bug. Prime95 is used to find prime numbers and is also very popular with performance and the overclocking community as a stress and performance test.

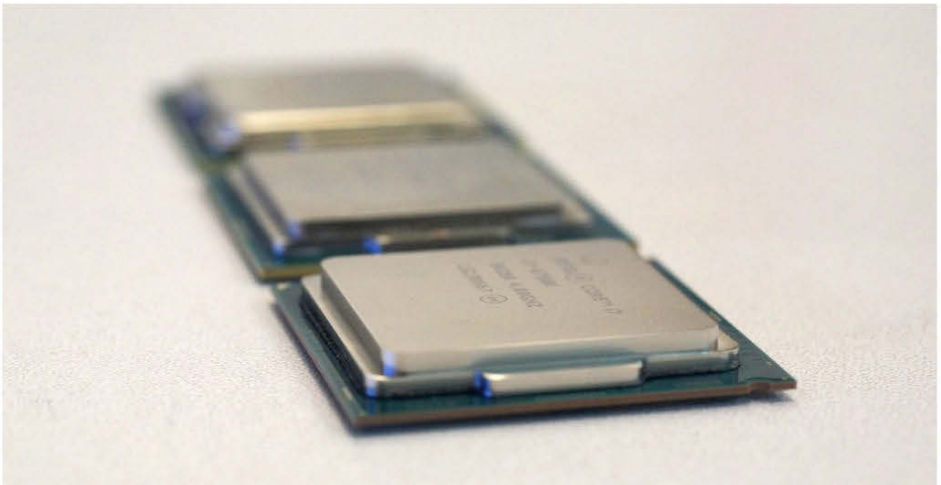
Besides the community post, Intel also confirmed to *PCWorld* the existence of the bug but placed an emphasis on the word *might* because there’s no guarantee you’ll hit the bug.

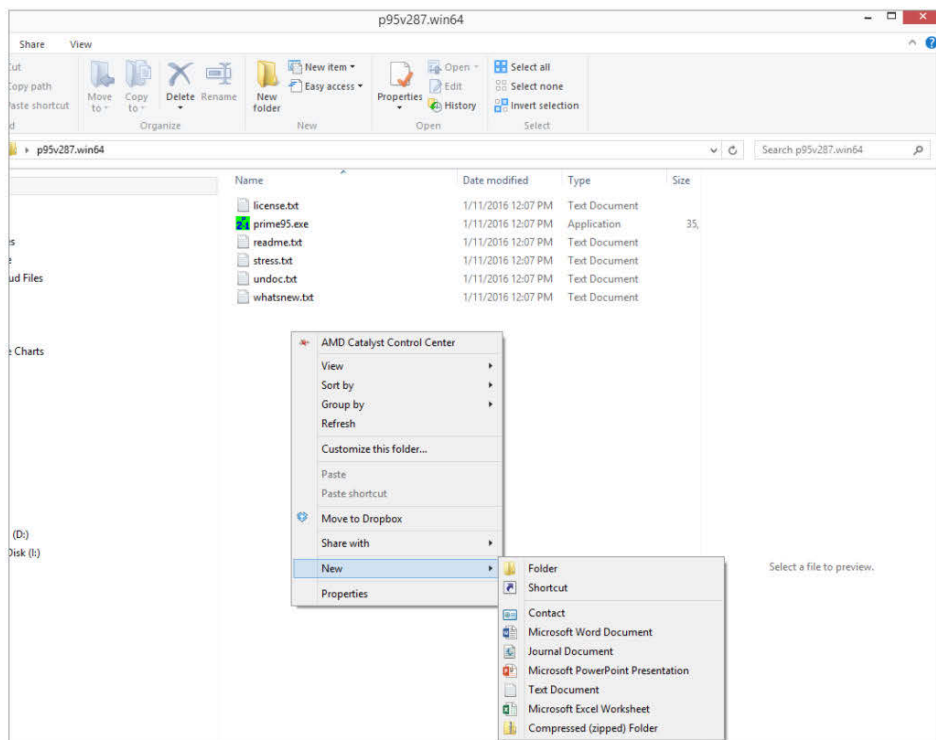
“Under some complex workload conditions, like those encountered when running applications such as Prime95, the processor may hang or cause unpredictable system behavior. Intel has released a fix that resolves the issue and we are working with external business partners to deploy this fix through BIOS updates,” an Intel official told *PCWorld*.

This may seem like Intel’s sugar-coating it, but the bug is truly sporadic. Some people have run into it, while others can’t reproduce it. The hang sometimes occurs after minutes, sometimes hours, and others never experience the lockup.

**Intel said some**

Skylake chips might lock up under a “complex workload conditions” but most people can relax on this one.

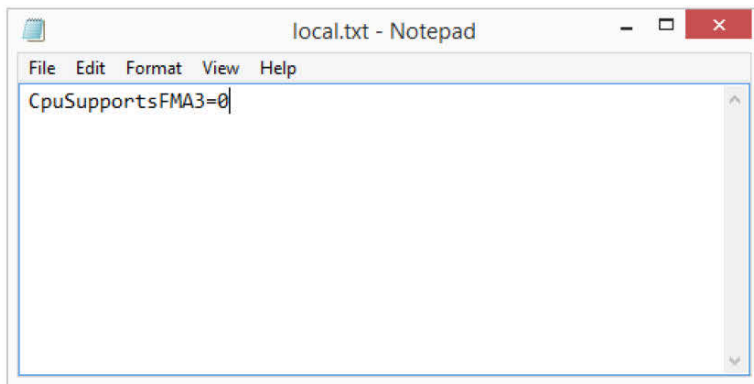




In my own testing, I used a Skylake-based laptop with a quad-core Core i7-6820HK and didn't experience the hang-up in a few hours of testing. Many of the people who've reported hitting the bug are doing so with the desktop Core i7-6700K chip, though.

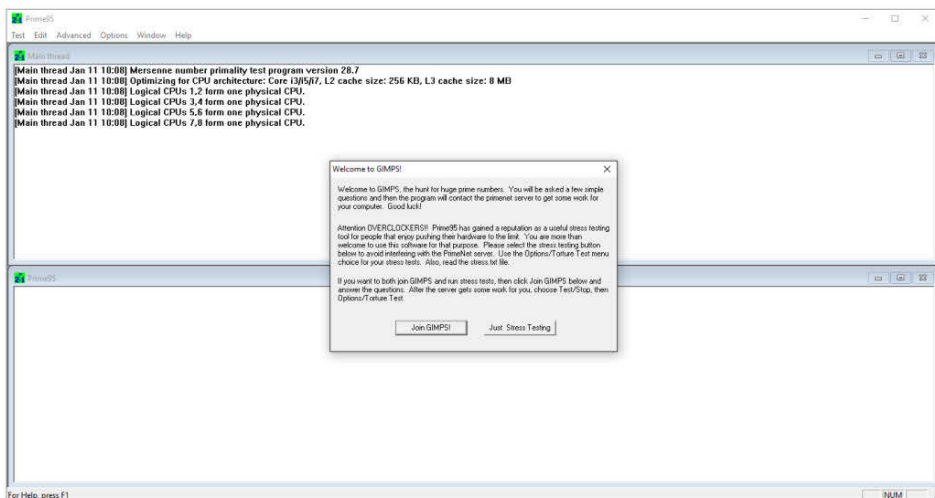
**Why this matters:** In the grand scheme of CPU “errata” or bugs, this one is fairly esoteric and really not worthy of being mentioned in the same paragraph as Intel’s infamous 1994 FDIV bug. The FDIV bug would manifest itself in Microsoft Excel spreadsheets and was serious enough that Intel recalled the CPUs to the tune of millions of dollars. The bigger bummer for PC users was when Intel couldn’t resolve a bug in its new TSX instructions, so it simply switched it off for many people. The Skylake bug can apparently be patched with a microcode fix.

**With the latest** version of Prime95, you will need to tell the program to use AVX instructions by creating a text file called “local.txt”



**You'll need to** create a text file to tell Prime95 to use AVX to hit the bug.

**Just skip and** select: Just Stress Testing.



## How to test for the Skylake bug

Chasing down a capricious bug sounds like a good way to avoid doing something else, so here's how to do it. Download ([mersenne.org/download](https://mersenne.org/download)) Prime95 version 28.7 from Mersenne95 and decompress the file into a folder.

If you use the current 28.7 version, you will need to create a text file in the folder using Notepad. You can do this by right-clicking in the Prime95 folder and selecting *New > Text Document*. Give the text doc-


ument the title “local.txt.” Once the file is created, double-click it to open with Notepad and type the line **CpuSupportsFMA3=0**. Save the file in the same folder.

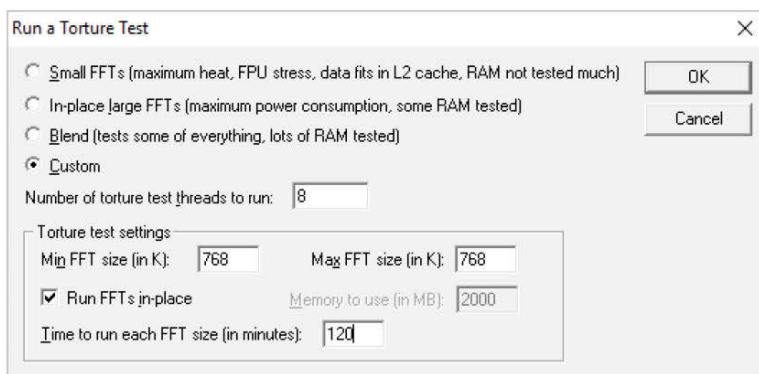
You have to do this because, according to the bug finders, by default the newer version of Prime95 will use AVX2 and the error appears to only occur with AVX.

Start Prime95 by double-clicking Prime95.exe. Dismiss the dialog by clicking *Just Stress Testing*.

A dialog box will appear to Run a Torture Test. Select Custom and change the Min FFT size (in K) to 768, and change Max FFT size (in K) to 768. Select Run FFTs in-place and also set the run time to 120 minutes or longer. Clicking *OK* will start the Torture Test.

Now just wait and see if it locks up. Most of the problems seem to occur with the top-end desktop Core i7-6700K, but Intel seems to be implying it could occur on other CPUs.

Before you run this test, you should be aware that Prime95 puts a heavy load on CPUs. Systems that are marginal on cooling or overclocked may crash on their own, so it's probably best to run this test on a PC with stock settings to make sure it isn't just an unstable overclock. 



**Run a Torture Test** [X]

☐ Small FFTs (maximum heat, FPU stress, data fits in L2 cache, RAM not tested much)
 ☐ In-place large FFTs (maximum power consumption, some RAM tested)
 ☐ Blend (tests some of everything, lots of RAM tested)
 ☒ Custom

Number of torture test threads to run:

Torture test settings:

Min FFT size (in K):  Max FFT size (in K):

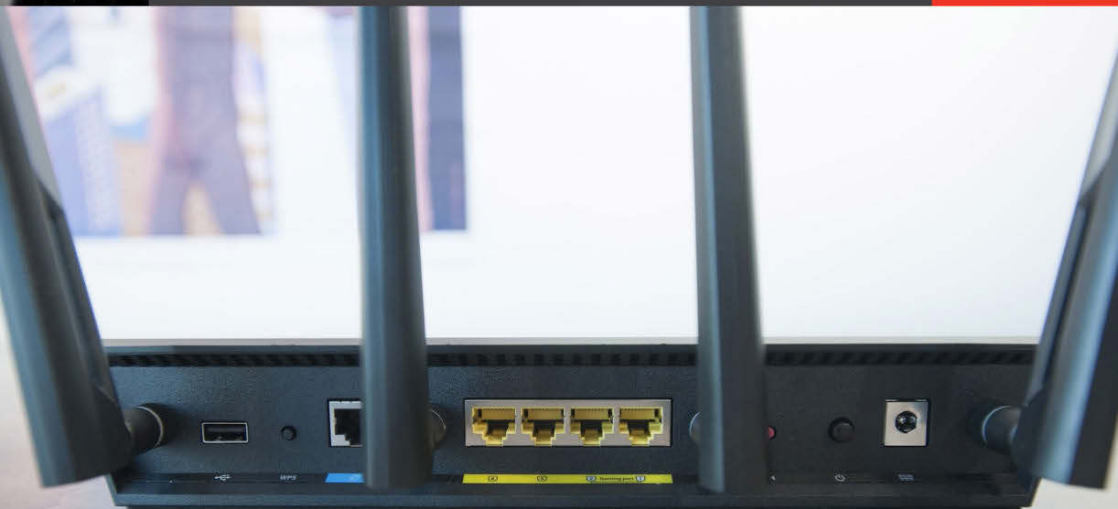
☒ Run FFTs in-place Memory to use (in MB):

Time to run each FFT size (in minutes):

OK Cancel

**Using these settings** in Prime95, people have reported being able to hang up their new Skylake CPUs.





# How to retrieve Wi-Fi passwords saved on your PC

**IT'S A GOOD** thing that Wi-Fi can bring so much magic into your house, it almost makes up for all the pains that come along with it. Almost.

One of the biggest pains of Wi-Fi is actually something that's self-inflicted: forgetting your network password. We've all been there. You take the advice of the security experts by creating a random, long Wi-Fi network password...and then promptly lose or forget that complicated password.

That's not a problem for any of the machines that were previously set up, but it could be an issue when you have guests or bring home a shiny, new Chromecast for your TV.

Here's how to retrieve all those seemingly lost passwords from your PC.

## When currently connected

For users on Windows 7 and up, it's easy to uncover the password for the network you're currently connected to. The instructions here are for Windows 10, but are generally the same for Windows 8.1, 8, and 7. If you'd like OS-specific instructions, however, check out Microsoft's help page ([go.pcworld.com/msuncoverpassword](http://go.pcworld.com/msuncoverpassword)).

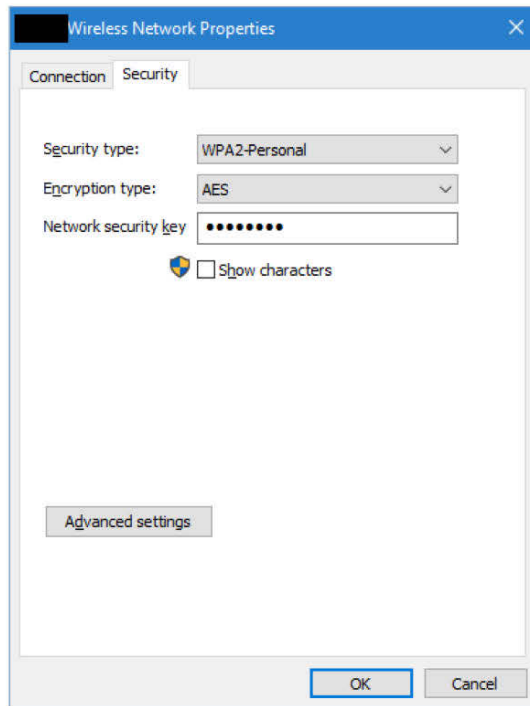
In Windows 10, right-click on the Start menu and select Control Panel. With the category view selected click on *Network And Internet > Network And Sharing Center*.

At the top of the window you'll see a section called *View Your Active Networks* listing your current connection. Click on the blue link listed as *Connections*.

This opens a window called Wi-Fi Status. Now click *Wireless Properties* and in the new

window click on the *Security* tab. Here you'll see a text entry box called *Network Security Key*, with the Wi-Fi password represented as a series of black dots. Don't worry if the number of black dots don't line up with your actual password length as these are just placeholders.

To see your password, click



**Windows 7 and up** can show you the password for your current Wi-Fi network.

the *Show Characters* box and your password will appear in the network security key box. Now you can copy it or show it to someone else.

## Your Wi-Fi past

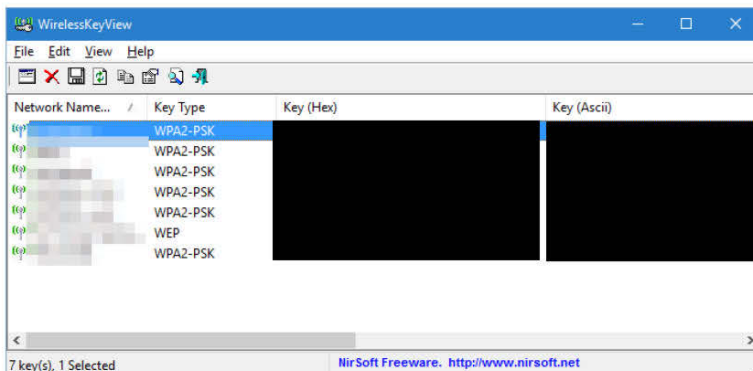
The above trick is easy enough if you need to know the password of the network you're currently connected to, but there's a trove of saved Wi-Fi passwords in your PC you might need.

The easiest way to get at them requires extra help from a free utility such as Nirsoft's WirelessKeyView ([go.pcworld.com/WirelessKeyView](http://go.pcworld.com/WirelessKeyView)). The program downloads as a zip file. Extract the contents to any location you'd like and then click the included .exe file. At this writing it was named WirelessKeyView.exe.

The program will open listing all the Wi-Fi network passwords your PC has saved. Most of the passwords should be listed under the *Key (Ascii)* column, but if you see gibberish there then try the *Key (Hex)* column.

WirelessKeyView is pretty easy to use, but if you don't like it there are many other alternatives such as Magical Jelly Bean WiFi Password Revealer ([go.pcworld.com/WiFiPassRevealer](http://go.pcworld.com/WiFiPassRevealer)).

Now that you've found your lost passwords this would be a good time to save them in a password manager ([go.pcworld.com/passwordmanagers](http://go.pcworld.com/passwordmanagers)). 🔌



Nirsoft's WirelessKeyView

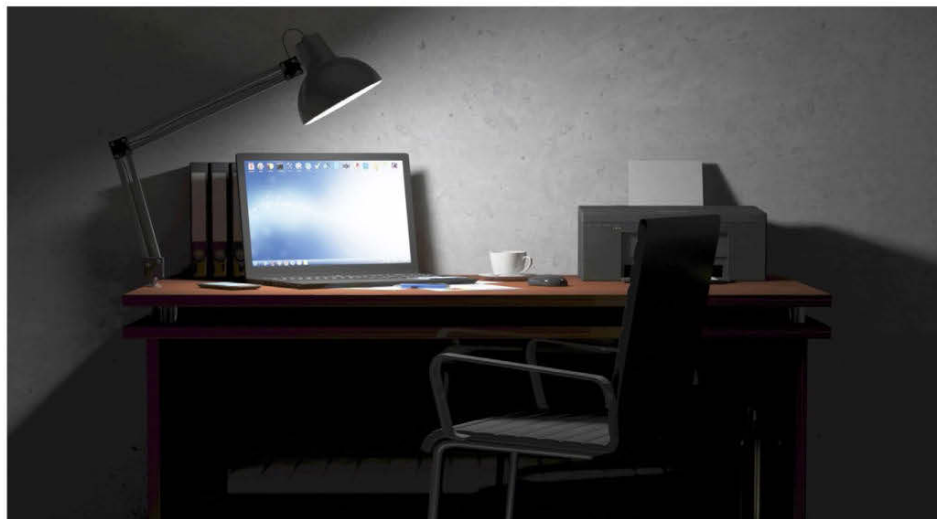


# Why you should turn off your PC, laptop, modem, router, and other tech routinely

Why leave stuff on? Why not? This has been debated since the birth of tech.

*Rick Klemann bought a new modem/router, and wants to know “whether I will shorten it’s lifespan if I keep it on. My son-in-law turns his off every night and I’m wondering if I should do that.” My answer covers more than networking gear.*

I have yet to see evidence that leaving an electronic device on 24/7 wears it out faster than turning it off at night. On the other hand, I haven’t seen any evidence that turning it off at night hurts it, either.




Nevertheless, I vote for turning things off whenever practical.

Leaving something on when you're not using it wastes electricity, and electricity costs money. What's more, if your electricity comes from burning carbon, it damages the planet we depend on. I'm not saying you should move to a cave and give up all of your gadgets (I certainly couldn't do that), but why waste power that you don't need?

Because Rick specifically asked about networking gear, let's look at that. I have a router, a modem, and two network printers plugged into one surge protector. When I researched an article on vampire power ([go.pcworld.com/vampirepower](http://go.pcworld.com/vampirepower)) earlier this year, I discovered that it would burn 12KWh over a month of absolutely no use. Without the printers, it dropped to 4.8KWh—still a lot to waste.

My wife and I now turn off that surge protector before going to bed, and turn it on in the morning, saving some power. But we couldn't do that if our daughters were still living with us. College kids work and play late.

Computers, of course, can be put into convenient power-saving modes. But shutting them down entirely will save even more. Yes, you'll have to wait while they boot up in the morning, but just as a good night's sleep clears the cobwebs from your brain, a fresh boot can make Windows faster and more stable.

The peripherals around your computer (monitors, speakers, and so on) can best be controlled with a smart surge protector such as the Belkin Conserve Smart AV ([go.pcworld.com/BelkinConserve](http://go.pcworld.com/BelkinConserve)). Plug your PC into the surge protector's Control outlet, and when your computer shuts down (or goes to sleep), the device cuts power to other outlets. 

I'm not saying you should move to a cave and give up all of your gadgets (I certainly couldn't do that), but why waste power that you don't need?

*Have a tech question? Ask PCWorld Contributing Editor Lincoln Spector. Send your query to [answer@pcworld.com](mailto:answer@pcworld.com)*

# Tech Spotlight

A video showcase of  
the latest trends



Watch the video  
at [go.pcworld.com/ehang184vid](http://go.pcworld.com/ehang184vid)

## The Ehang 184 is a drone for transporting people: yes, people!

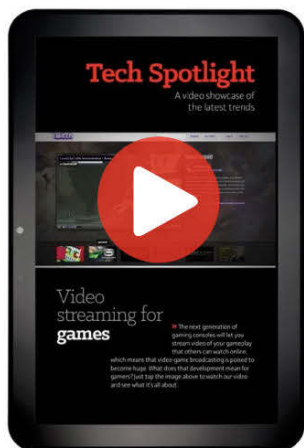
» The Ehang 184 Autonomous Aerial Vehicle (AAV) is entirely real—however turbulent its legal airspace may be: a 142-horsepower “personal flying vehicle” that can fly at an altitude of more than 11,000 feet. The cost, if it ever came to the U.S.? Maybe \$200,000 or \$300,000 or so.

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